

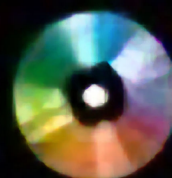
ORTHOPEDICS

Quick Review

NEET/ONB Supplement

Ripped by
Dr. Prodigious

Apurv Mehra



With Interactive CD-ROM

This book comes with a CD-ROM including an interactive version of the textbook, as well as Apurv Mehra's oral aspects, a strategic approach to answer questions in short time and this version of the book is highly relevant to the latest revision of NEET/ONB.

**All Topics
Covered
till August
2012**

Edited by
Anil Arora
Thameem Saif

Forewords
SM Tuli
Sudhir Kumar
SAS Marya

The format of discussion of questions is as per MCQs which is subject to change with or without further notice

JAYPEE

ORTHOPEDICS

Quick Review for NEET/DNB

Apurv Mehra

MBBS, M.S ORTHO, D.N.B ORTHO
Dip. SICOT (Belgium)

Edited by

Anil Arora
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Forewords

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Orthopedics Quick Review for NEET/DNB

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THANKS TO THE ALMIGHTY FOR HONORING ME
WITH THE TORCH TO SPREAD THE LIGHT OF KNOWLEDGE



MAA SARASWATI Goddess of Education

*I dedicate my work to My patients who have made me an Orthopaedician and
my students who have made me a teacher.*



FOREWORD

Despite the availability of more lucrative opportunities to the current generation in business and technology, the brightest of the young generation of any country opts for medicine as a career. Orthopaedics happens to be one of the most sought after clinical discipline, fully aware of the long years of arduous training involved for success in the profession. It is just natural that the best amongst the admission seekers would be able to enroll themselves for the limited seat available in Orthopaedics in the teaching and training institute. To maintain objectivity and transparency, admissions based upon objective MCQ type of questions is the best of all assessment systems, granting that no assessment system is really perfect. This book is intended to help the student to quickly review the subject for MCQ examinations. The table of contents of the book covers the wide landscape of orthopaedic discipline.

Dr Apurv Mehra over the last 9 years has been trying to analyse the system of MCQ type examinations, collate and organise the material for understanding at the graduate level. This book would help the prospective candidates to channelise their thinking process for the admission tests. The question-answer style of various sections would also help the prospective faculty (who compose the MCQs) to standardise the frame word for constructing the question with least ambiguity and for appropriate level of MBBS graduates. It is a laudable effort by Dr Apurv Mehra, and it is a must-read for the admission seekers.

S.M.TULI

MBBS, MS, PhD, FAMS

Formerly: Director

Institute of Medical Sciences

Banaras Hindu University Varanasi, India

Senior consultant spinal disorder and orthopedic

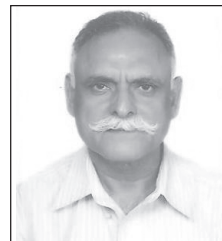
VIMHANS Hospital, Nehru Nagar, Delhi



FOREWORD

Orthopaedics today has become one of the most sought after branches in medicine and similar is the representation of number of questions in PG entrance examinations. Clear concepts and crisp knowledge is often required to solve MCQS irrespective of the type and format of questions.

Orthopedics quick review comes with a complete package for PG aspirants to have a concept based knowledge, important points to remember and recollect at the time of examination. Illustrative diagrams, images, flow charts and summary have been made keeping in mind the need of students today. **This book is not one for the shelf but is for the last minutes specially chapters like complete summary of Orthopaedics and for the students by the students.**



Dr Apurv Mehra has carefully included questions and topics keeping in mind that the whole spectrum of Orthopaedics is covered and retained by students. The interactive DVD that comes along with it is also extremely valuable to have a conceptual approach to MCQS and has lecture of important topics which shall be of importance to students.

Orthopaedics Quick Review is a must read for Orthopaedics MCQS.

SUDHIR KUMAR

Head of Department
Department of Orthopaedics
University College of Medical Sciences and
GTB Hospital, Delhi.



FOREWORD

Dr Apurv Mehra has put forth a new volume for the aspiring postgraduates in orthopaedic surgery. While there is an ocean of knowledge and texts available this volume comes from the heart of a young orthopaedic Surgeon who has himself faced the pleasures and difficulties of acquiring knowledge.

Many a texts are available to the examinees and seekers of information and each has a flavour of its own. In this case Apurv has a refreshing approach towards imparting information. The text comes with useful pictorial diagrams and X-Rays to illustrate concepts. Whilst putting forward a multiple choice question the author has given an elaborate reasoning for the best choice answer. He has classified the chapters with good deal of thought.

It makes a simple read for those revising for examinations and subtly adds information to the candidates knowledge bank. In fact the volume will be an asset in the collection of all those learning and teaching the art of Orthopaedic surgery.



SKS MARYA

Vice Chairman
Max Healthcare, New Delhi
Chairman
Orthopaedics, Max Healthcare



ABOUT THE EDITORS

ANIL ARORA

Dr (Prof) Anil Arora holds an experience of more than 20 years in Orthopaedics. He has been **Senior Orthopaedic Surgeon** and Professor of Orthopaedics at University College of Medical Sciences, Delhi. He is an Internationally known figure in Orthopaedics. He is a Joint Replacement Surgeon, currently He is Head Of The Department Of Orthopaedics at Max Superspeciality Hospital and Institute of Joint Replacement, Patparganj, Delhi. He is known for his brilliant clinical skills and knowledge.

He has many **International and National Achievements and Awards** to his credit like:

- SIROT Award in USA (First Indian to win this award from a body of 85 countries),
- Weller Gold Medal
- AA Mehta Gold Medal of Indian Orthopaedic Association
- Silver Jubilee Oration Award of Indian Orthopaedic Association
- He has also delivered White Paper of Indian Orthopaedic Association
- He has published about 50 research papers in various International, National and Regional Journals
- He has about 20 Chapters in International and National Orthopaedic Text Books

Prof .Anil Arora has carefully edited the contents of this book and has given valuable feedbacks in the making of this book.



THAMEEM SAIF

Dr Thameem Saif, M.D.Medicine, is a renowned teacher held in very high regard by medicos both in India and the US. He is an intellect of high order with brilliant teaching skills. His inputs have been found to be very valuable by his students across the country and he has helped lots of students achieve their dreams of clearing the tough Indian entrance exams and the USMLE. Most of the toppers in the country today thank him in their heart for playing an important role in their success. He is well known for solving MCQs by an organized approach to reach towards the answer. The DVD recording is an interactive session with the author about how to approach MCQs with latest patterns proposed for National Eligibility Entrance Test. He has carefully gone through the book and his suggestion has given birth to a chapter on complete summary of orthopaedics for students to revise in last minutes.





Preface To OPQR NEET and DNB Edition

Considering the recent changes in the upcoming PGEE Exams and subsequent requirement of students, the committee has released its FIRST NEET AND DNB Based modified/supplementary edition of OPQR



Highlights:

- Complete summary of Orthopaedics (with highlighted last 5 years AIIMS/AIPG Questions)
- Questions on expected NEET pattern
- Last 20 Years DNB Questions
- Special chapter 'For The Students By The Students' to clarify most common doubts
- Flowcharts with Mnemonics
- All the questions till 2012 are covered
- All these features in less than 100 pages so that students benefit to the maximum and are able to attempt all orthopaedics and associated topics for AIIMS, DNB and NEET Exam.

LOOK OUT FOR THE COMPLETE EDITION OF ORTHOPAEDICS QUICK REVIEW (OPQR) IN DECEMBER 2012

Releasing in Dec. 2012 Preface to Orthopaedics Quick Review

Orthopaedics today has become a highly important subject in entrance Exams

The rapid increase in conceptual questions and increase in number of questions in major exams in year 2012 sets an example.

Number of questions of orthopaedics in AIPG 2012 was 16 and from vast subject like medicine the number of questions were about 24: continuing the same trend in May AIIMS 2012 Orthopaedics again had 15 MCQs and Medicine 18 MCQs.

The DNB paper in August in spite of mentioning less number of questions had about 12 questions from orthopaedics (out of total 180 questions). Thus it is a short strong subject that will help you score if you get the concepts correct.

Orthopaedics quick review is a book made with an intention that students are able to read the book within 5 days with memorizing all the mnemonics with a target of 80 pages per day and that should complete it in 5 days !

It also has all the questions arranged from recent to backwards and also the chapter sequence is according to the importance of topics in entrance exams.

At the end of each chapter new questions on the basis of Assertion/ Reasoning, Images, True & False questions have been given to practice for NEET exams.

Last 80 pages are for revision in last 3 weeks before you go for any exam that would help you remember all the important topics asked in recent exams. They include summary of entire orthopaedics (with highlighted All India and AIIMS questions), with a chapter for the students by the students and also last 20 years DNB questions as they will be very important because latest All India will be NEET based with National Board of Examination conducting the exam !

It comes with an important DVD recording that gives you concepts of important topics

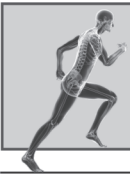
All the topics of all the exams till December 2012 are covered (Including NEET Exam)

It is a concept based book for memorizing forever

This book is a demand based supply and is channelized according to student needs communicated to me during my teaching classes^a

I am a student of science and would sincerely apologise for any mistake inadvertently made^a Feedback is most valuable for any author or teacher to improve. Please feel free to suggest or notify any error in the content on my emails. orthopedicsquickreview@gmail.com

APURV MEHRA



FOR MY PATRIOTS

A student reading this book is a person preparing for Indian entrance exams, thus living with a desire to devote this life to our country and opting to stay here rather than opting for the greener pastures abroad. Trust me its worth staying here and more importantly I feel responsible as a person and as a teacher to support you in your venture and thus I am presenting a verified book on orthopaedics permitting you to take a shot not only at orthopaedics questions but also many other subjects.

A message from the heart...

Draw a plan for the next day before you sleep so that by the time you get up for the day you already have a target !

(This small change has done miracles in many lives)

Minimum requirement to clear entrance exam

6 hours per day without mobile phone around you, for a period of six months non stop ^a..

The selections in entrance are not based upon intelligence and knowledge but is based on revision of recent topics and proper planning^a. so keep revising^a.

Don't count the days make the days count !

If you feel miracles don't take place this one is for you

ALBERT EINSTEIN: Most of us take Einstein's name as synonymous with genius, but he didn't always show such promise. Einstein did not speak until he was four and did not read until he was seven, causing his teachers and parents to think he was mentally handicapped, slow and anti-social. Eventually, he was expelled from school and was refused admittance to the Zurich Polytechnic School. It might have taken him a bit longer, but most people would agree that he caught on pretty well in the end, winning the Nobel Prize and changing the face of modern physics.

My Grand Mother always used to tell me

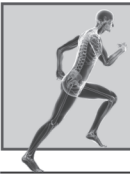
Lines from Guru Granth Sahib.....

"Teri kismet da likha tere toh koi kho nahin sakta"

Tu shram (Karam) kara chal bande...

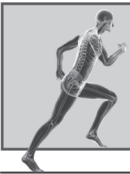
"Je usdi meher hove ta tenu o v mil jauga jo tera ho nahin sakta"

Chase your dreams and I pray to almighty he grants it!



SPECIAL THANKS TO

1. My seniors at Max Superspeciality Hospital, **Dr (Prof) Anil Arora** and **Dr Amit Srivastava** for supporting me in writing this book and managing things in my absence without their support nothing would have taken place. I also extend my thanks to the whole unit for the same.
2. **Dr Harpreet Singh**, MBBS, M.S. Orthopaedics (MAMC) National Gold Medalist for verifying the contents of the book.
3. **Dr Taruna Mehra** MBBS, M.D Pediatrics (MAMC) National Gold Medalist, Nephrology Fellowship (AIIMS) for contributing to chapter Pediatrics orthopaedics
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9. **Mr Vijay Kumar** and **Mr Gaurav Budakoti** for coordinating the work.



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Thanks to my grand parents Smt Shanti Kapoor and Shri J. K.Kapoor for teaching me to always look upto god with faith

Thanks to my parents Smt Neeru Mehra and Shri Arun Kumar Mehra for always supporting me to chase my dreams.

Thanks to my parents in law Smt Satya Chutani and Mr Jagdish Chutani for teaching me value of honesty.

Thanks to my wife Dr Taruna Mehra for her day to day support, encouragement and motivation that kept me going even beyond my own limits. Also For helping me discover that even complex problems can be resolved by simple approach.

Seth Family and Khanna Family and their associated families.

Late Smt Krishna and Late Shri K.B. Seth and their family

Smt Satish and Late Sh. C.B. Seth and their family

Smt Lajja and Shri PB Seth and their family

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Thanks to Maulana Azad Medical College, Delhi as an institution for developing me into a complete clinician

Thanks to the great batch of 1998

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Prof Sudhir Kumar (Our Head of Department)

Prof Anil Arora (My Brilliant Guide)

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Dr Anil Aggarwal

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Prof MP Singh

Dr Manish Chadha (One of the most brilliant person)

Dr Amite Pankaj

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Special thanks to three prestigious pearls of orthopaedics for blessing the book...

Prof . S.M. Tuli (Teacher of teachers) on mentioning his name only my head bows down with respect for his approach to orthopaedics and to life.

Prof Sudhir Kumar for letting me prosper as a student of science and verifying the content of my lecture recording .

Dr S.K.S. Marya for being an important driving force and being an ardent author of many books himself.

Thanks to my Seniors in our Orthopaedics unit at Max Superspeciality Hospital, Delhi.

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Dr Amit Srivastava who has always treated me like his younger brother.

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Thanks to their team for providing me fantastic support to perform as a teacher.

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Mr Heera, Mr Monu, Mr Ravi, Mr Sunil, Mr Madhav, Mr Sanjeev, Mr Mukesh, Mr Anupam and all others who have always been there.

Special thanks to Dr Thameem Saif

For reasons and words even dictionary would fall short off

Thanks to all my friends who actually were there at times when almost no one was there

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And all those whose name I am not able to recollect right now but they are always in my heart.

The team that works with me at Max Superspeciality hospital, Delhi

Especially **Mr Vijay Kumar, Mr Ashish Avasthi, Miss Payal Bhatia, Mr Gaurav Budakoti, Mr Kunal Walia, Mr Chaitanya Das, Mr Raj Kumar, Mr Ravi kumar, Mr Sanjay, Mr Amresh Pandey & Miss Anita.**

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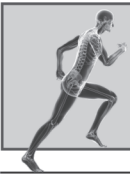
Thanks to **Mrs Seema** for drafting the coverpage for the book.

From the Publisher's Desk

We request all the readers to provide us their valuable suggestions / errors (if any) at:

jaypeemcqproduction@gmail.com

so as to help us in further improvement of this book in the subsequent edition.



FEW VALUABLE PEARLS BEFORE EXAMINATION

Every time we would go to write an exam our seniors (at MAMC) will tell these to us....

1. Sleep on time and sleep well a night before.
2. Before sleeping preferably speak to your closest family member or your wise friend and do make a promise that you will give your best and keep a positive attitude.
3. Reading few jokes from a joke book has been found as a stress reliever by some.
4. On the morning of the exam, never go empty stomach never eat too much, take a balanced meal. A fruit ,a sandwich and a cup of coffee/tea is preferred by most.
5. Always Get ready on time and wear your most comfortable clothes and shoes. Trying out new clothes or a new footwear is not advisable.
6. Most prefer some music in morning hours to destress themselves.
7. Leave early from House for the centre and avoid driving at any cost.
8. Make sure to carry your Photo Identity proof, Admit card and Stationary.
9. At the centre preferably involve yourself in some meditation or stay with your family or friend accompanying you. Avoid in mingling with groups.
10. Please do all the formalities before the exam on time to avoid any last minute panic.
11. Follow instructions of the examiners or invigilators at the centre dare not involve in any conflict with them.

During the exams...

1. Start the paper and read the question very carefully.
2. ONE liners should be read 3 times and message should be very clear what the examiner is asking and then read all 4 choices.
3. One by one try to rule out options so that you have more probability of getting the answers correct (Dr. Thameem rule) e.g. If you select one answer out of 4 than your success probability is 25% but if you rule out one answer than your success probability is 33% and if you are able to rule out 2 options than you have to mark from the remaining 2 choices thus your success probability is 50%.
4. Don't make a mistake of marking the first answer without reading all 4 choices. Most of the examiners set 3 to 4 % questions on the principle that student marks the first answer on reflex. This makes a total of about 10 to 12 questions in your exam thus can make a huge difference.
e.g. Question is asked Most common tumor of hand^a..
First choice is enchondroma
Second is chondroblastoma
Third is squamous cell carcinoma
Fourth is Chondrosarcoma
Student takes it as a question of bone tumors and mark the first answer as enchondroma only to get it wrong without realizing that most common bone tumor of hand is enchondroma and most common tumor of hand is Squamous cell carcinoma which is the answer here.
5. Please don't try to find mistakes in questions for all practical reason try to answer questions taking them as correctly framed eg. Cheralgia paraesthetica involves which nerve^a students think that there is printing mistake instead of Meralgia paraesthetica and mark the answer as lateral cutaneous nerve of thigh but they are unaware that there is a different condition called as cheralgia paraesthetica which is compression neuropathy for superficial radial nerve.

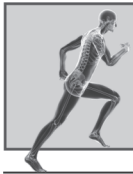
Few Valuable Pearls before Examination

6. Multiple lines or clinical questions should be answered on remembering the following points
 - a. Age of the patient may help you decide the answer.
 - b. Unilateral or bilateral may help you rule out few choices
 - c. Normal feature mentioned helps rule out few choices eg normal ALP rules out osteomalacia as ALP is always increased in osteomalacia.
 - d. Please make a note of important radiological findings .
 - e. Give very high importance to histopathological or biopsy features to arrive at diagnosis and always give tissue diagnosis more importance than radiological findings because radiological finding can be non specific.eg.if it is mentioned a bone tumor with codmans triangle and round cells which are Mic 2 positive than answer will be Ewing sarcoma on the basis of biopsy findings of round cells and mic2 positive cells whereas codmans triangle is more commonly seen in Osteosarcoma but can be seen in any malignant bone tumor.
 - f. Always make a note whether most common finding is asked or most characteristic finding is asked.
 - g. Similarly observe that whether investigation of choice is asked or gold standard investigation is asked. If you look at questions investigation of choice refers to next investigation and gold standard refers to best investigation usually.
7. Each question is highly valuable and don t take any question lightly how much confident you are .
8. It is very strange that students try to save time on the questions that they have knowledge about and give more time to questions they are not aware of .Actually you must focus strongly on topics you know and answer their questions carefully rather than giving more time to topics you are unaware of. Most toppers get the repeat topics correct as compared to scoring high on new topics.

How the things change for recent exams....(DNB/NEET/AIIMS/PGI)...It would be practically impossible to separate your preparation. Hence a combined approach is suggested

1. It would be a good option to write DNB exam as the same body will be conducting NEET exam although they might turn out to be totally different at end.
2. It is advisable to go through last 3 to 4 DNB papers.
3. It is good to do last 2 -3PGI papers
4. Last 7 years AIIMS papers would be important .
5. Memorize last 5 years all india questions.
5. Revise your notes you have made and also course notes if you had joined any.
6. This is no time to waste on finding answers to controversial questions just decide an answer what you will mark if they come in exam.
7. Day of writing the exam actually did not matter in August DNB .
8. Your knowledge will be more important than any strategy.
9. Make use of every single day.
10. Don t worry as all across the country exams have been preponed and everyone is sailing in same boat you are not at a selective disadvantage .Rather let others panic you plan and act you might actually benefit.
11. Keep a positive attitude through out.
12. All the best "Go crack it".

APURV MEHRA



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Fracture and Fracture Healing
Advance Trauma Life Support
Upper Limb Traumatology
Spinal Injury
Pelvis and Hip Injury
Lower limb Traumatology
Fracture Management
Amputations
Sports Injury
Neuromuscular Disease
Peripheral Nerve Injury
Joint Disorders
Metabolic Disorders of Bone
Pediatric Orthopedics
Osteochondritis
Avascular Necrosis

2. QUESTIONS ON EXPECTED NEET PATTERN

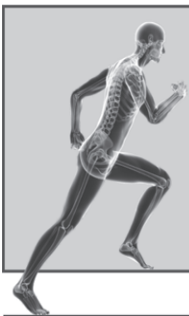
74 – 83

3. DNB QUESTIONS

84 – 104

4. FOR THE STUDENTS BY THE STUDENTS

105 – 133



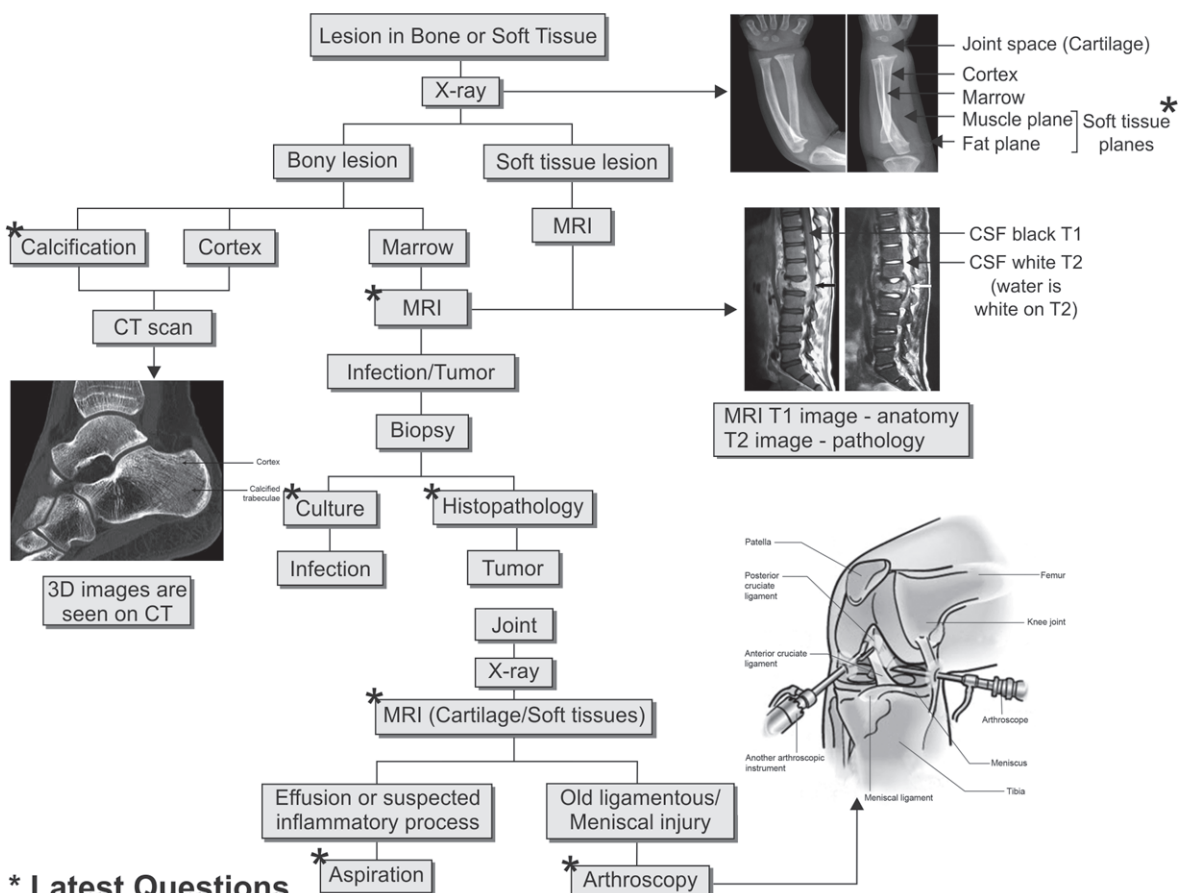
COMPLETE SUMMARY OF ORTHOPEDICS

CHAPTER

1

1. IMAGING FOR ORTHOPAEDICS

1. X-rays is done for screening (Cartilage not seen)
2. CT Scan is done for bone Cortex and Calcification
3. Calcification of Ligament-CT Scan
4. MRI is done for Soft tissues/Cartilage/ Bone Marrow/Unilateral stress fractures (Investigation of choice)
5. MRI is done for occult fracture neck femur (May AIIMS 2012)
6. Bone scan is done for bilateral stress fractures. (Investigation of choice) and metastasis.
7. Metastasis-PET CT scan > Bone Scan (AI 2011)
8. Arthroscopy is done for joints Knee> Shoulder
9. Tumors and Infection can mimic each other
10. Differentiated by tissue diagnosis (May AIIMS 2012)
11. Culture is best for infection, T.B. Spine CT guided biopsy gold standard (May AIIMS 2012)
12. Histopathology for tumors



2. INFECTIVE DISEASES OF BONE AND JOINT

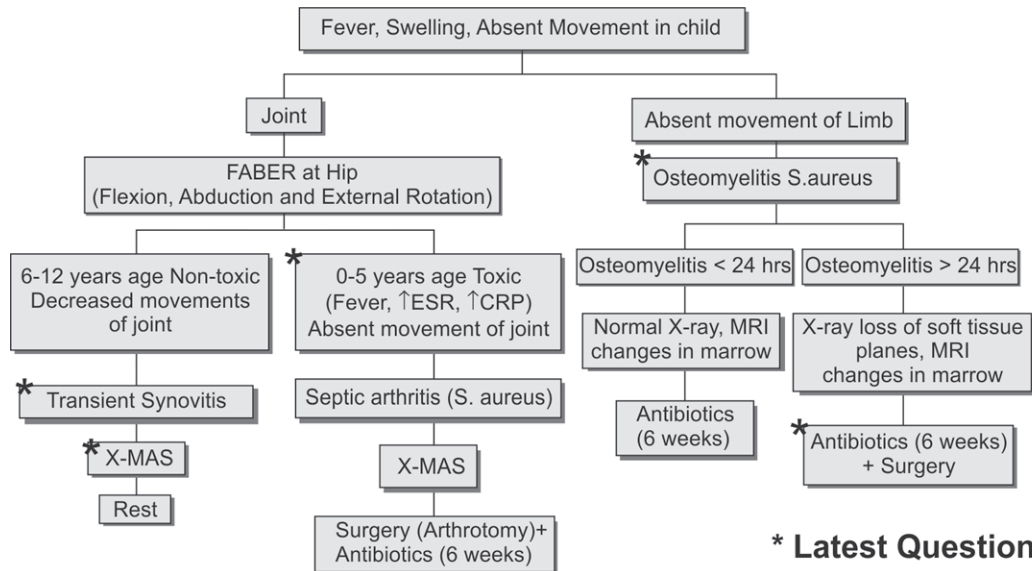
1. **X-ray:** After 24-48 hours loss of soft tissue planes and on day 7-10 periosteal reaction is seen. (Periosteal reaction is usually absent in tuberculosis) (AI 2008)
2. **Best radiological investigation for bone infection is MRI > Bone Scan** (AI 2007)
3. **Bone and joint infections Gold standard is always culture and sensitivity**
4. Inflammatory Joint swellings order of investigations is

X-ray
MRI
Aspiration
Swelling of a joint
X-MAS

(AIIMS May 2009)

Acute Osteomyelitis

- Metaphysis is commonest and first affected (AIIMS May 2009)
- Lower femur metaphysis commonest site (AI 2008)
- Staphylococcus aureus most common organism overall (AIIMS Nov 2010)
- Sickle cell anemia –salmonella (PGI 97)
- I/V drug abusers-Pseudomonas
- Loss of movement of limb clinical indicator



* Latest Questions

Chronic Osteomyelitis

Causative organism; Staphylococcus Aureus

Sequestrum: Avascular piece of bone surrounded by granulation tissue-pathognomic of chronic osteomyelitis. (PGI 2009)

Involucrum is dense sclerotic new bone surrounding the sequestrum At least 2/3rd surface of sequestrum should be surrounded by involucrum before carrying out sequestrectomy.

Treatment

Remove the sequestrum (Sequestrectomy)

Identify the organism and control the infection (most important step)

Fill the gap (Bone graft / Bone cement-Poly Methyl MethAcrylate)

Provide a good soft tissue coverage

Swelling With Multiple Discharging Sinus

Over mandible (or head - neck region) – Actinomycosis

(AI 2003)

On Foot – Madura foot/Maduromycosis

Paronychia – infection of nail bed Staph, organism is Staph Aureus

Felon – infection of pulp space, Staph Aureus, most commonly affects thumb > Index finger

(2012)

Infectious Tenosynovitis (Kanavel sign are seen)–Staph Aureus.

(AIIMS Nov 2007)

3. TUBERCULOSIS OF BONE AND JOINTS

- Tuberculosis is a disease affecting joints>bones
- Hematogenous spread Paucibacillary lesions
- Spine(50%)>hip(15%)>knee(10%) of all musculoskeletal cases
- Spina Ventosa is Tuberculosis of short bones of hand.
- Tuberculosis of shoulder is dry(no effusion) - caries sicca (dry)
- Potts spine – Tuberculosis of spine
- Paradiscal region commonest, rarest is synovitis of facet joints, **Second Rarest is spinus process.**
- Most commonly affects Dorsal >lumbar>dorsolumbar junction
- Earliest Symptom pain
- 1st Sign tenderness
- 1st Neurological Sign: Increased deep tendon reflexes or Clonus, Twitching of muscles may be even earlier.
- Motor weakness earliest, than sensory involvement than bowel bladder involvement

(AI 2012)

(AIIMS Nov 2010)

(PGI June 2006)

Investigations

- **X-ray:** Loss of Curvature of spine due to muscle spasm > Paradiscal Lesion
- **MRI:** Best Radiological Investigation
- **CT Guided Biopsy:** or tissue diagnosis- Best Investigation

(AIIMS May 2012)

Please Note:

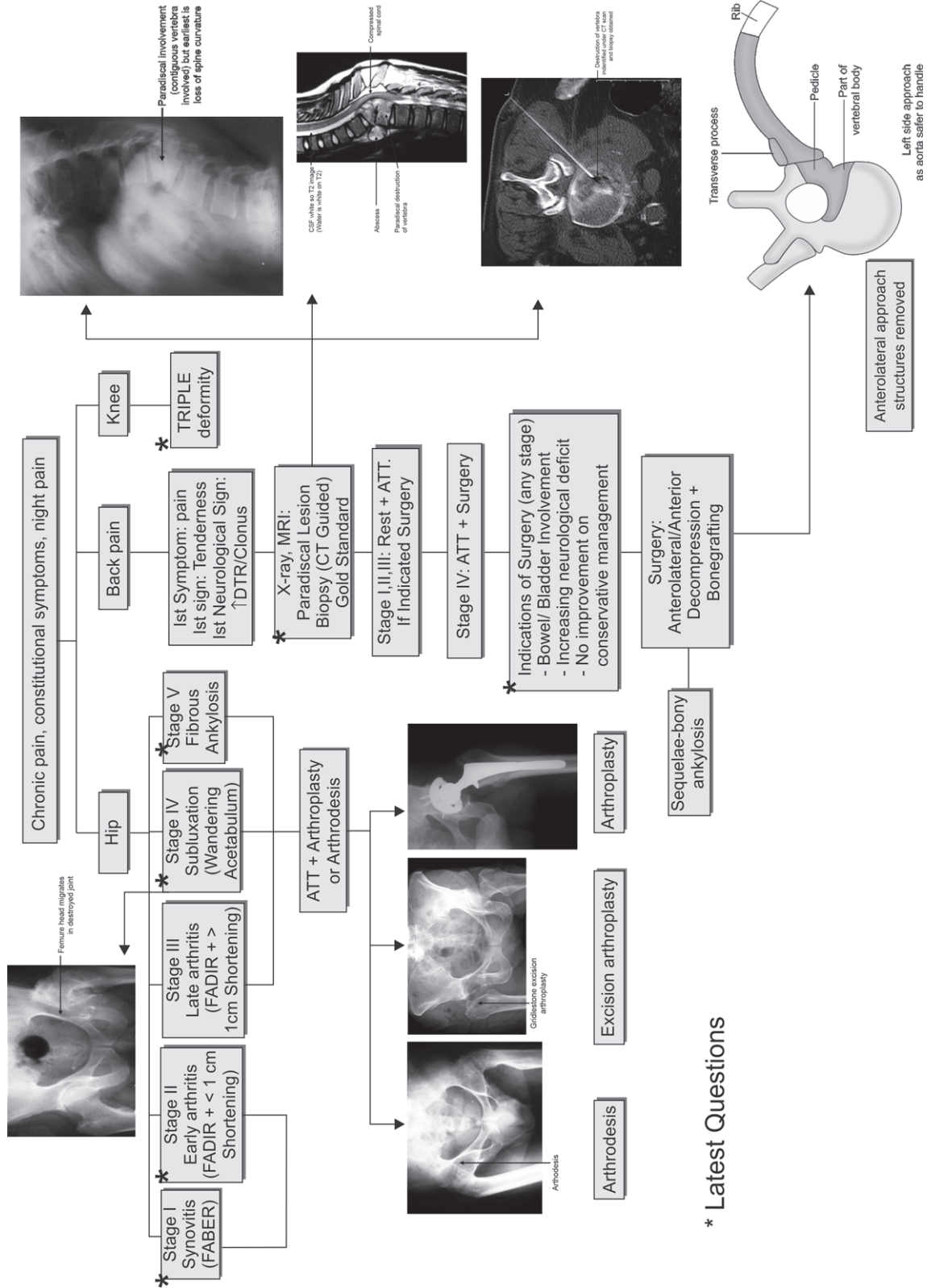
FABER: Flexion, Abduction and External Rotation

FADIR: Flexion, Adduction and Internal Rotation

Ankylosis: Pathological Fusion of Joint

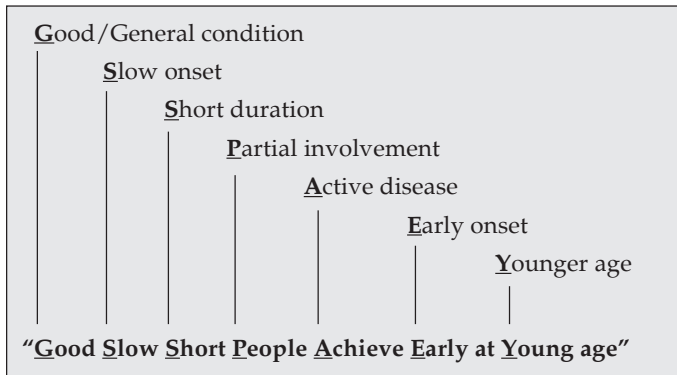
Arthrodesis: Surgical Fusion of Joint.

Orthopedics Quick Review

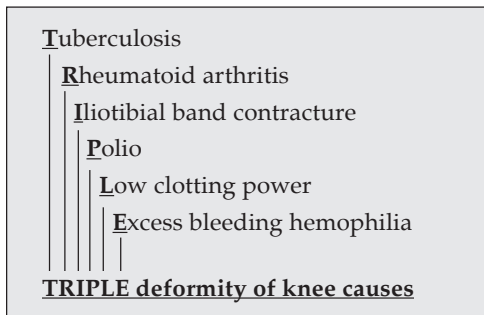


Good prognostic factors for Potts spine

(PGI 2008)

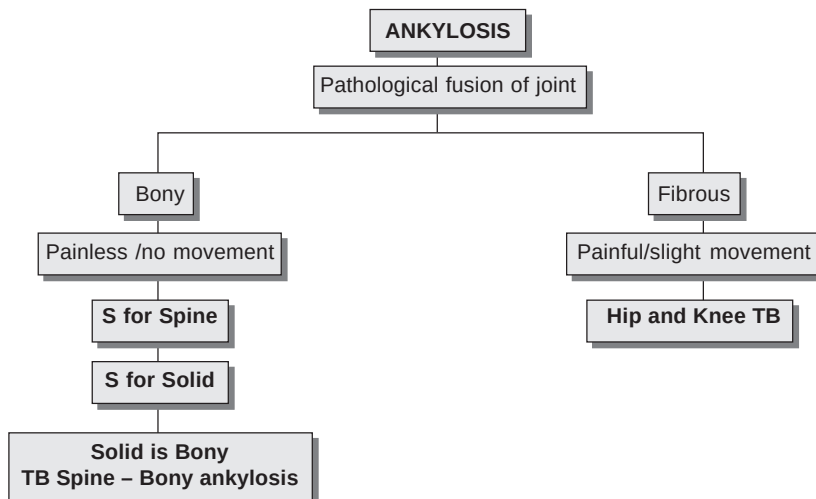


	T B hip in HIV	AVN Hip in HIV
Incidence	More Common	Less Common
Deformity	FABER stage of synovitis may be prolonged on treatment than subsequently with onset of arthritis – FADIR	Limitation of abduction and internal rotation so initially position is adduction and external rotation (opposite to movements limited) and than subsequently with onset of arthritis FADIR
	Unilateral usually	Bilateral usually



(AIPG 2008)

TRIPLE deformity of knee posterior subluxation/External rotation and flexion



4. ORTHOPAEDICS ONCOLOGY

Important points to remember

- Most common bone tumors – Secondaries
- Most common primary malignant bone tumor – Multiple Myeloma
- Second most common primary malignant bone tumor – Osteosarcoma
- Commonest malignant bone tumor of flat bone – Chondrosarcoma
- **Commonest Tumor of Skull Vault Ivory Osteoma or Compact Osteoma or Eburnated Osteoma** (Latest 2012)
- Commonest true benign tumor – Osteoid osteoma
- Most common benign tumor of spine – Hemangioma
- Benign bone tumor have well defined margin, uniform consistency on feel and narrow zone of activity.
- **Malignant tumor have ill defined margins, variable consistency and wide zone of activity.** (AIIMS May 2011)

Differential diagnosis of bone tumors

- Osteomyelitis has same clinical presentation as Ewings sarcoma and osteosarcoma
- Myositis ossificans mimics Osteosarcoma but Myositis has dense peripheral calcification and osteosarcoma has central calcification.
- **Bone Infarct ~ Enchondroma** (AIIMS May 2011)
- **Bone islands ~ Osteoid osteoma** (AIIMS May 2011)
- **Fibrous dysplasia ~ Giant cell tumor** (AIIMS May 2011)

Important ages and location

- 1st decade usually Ewings sarcoma (Can Be 5 To 20 Years), unicameral Bone Cyst
- 2nd decade usually osteosarcoma, Aneurysmal Bone Cyst. (AIPG 2007)
- **After skeletal maturity Giant cell tumor** (Epiphysis)
- Epiphyseal before skeletal maturity (chondroblastoma) (AIPG 2012)
- **After 40 metastases or Multiple myeloma**

Remember

1ST decade Diaphyseal –Ewings Sarcoma
2nd decade Metaphyseal –Osteosarcoma

Classical radiological features*

• Sun ray appearance*/Codman's triangle • Onion peel appearance* • Soap bubble appearance* • Patchy calcification* • Homogenous calcification	Osteosarcoma but can be seen in any malignant lesion Ewing sarcoma but can be seen in any malignant lesion or chronic osteomyelitis Osteoclastoma, adamantinoma Chondrogenic tumors Osteogenic tumors
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Order of investigations usually X-rays than MRI and than Biopsy

Biopsy is the ultimate diagnostic technique.

Enneking's Classification System for bone tumors

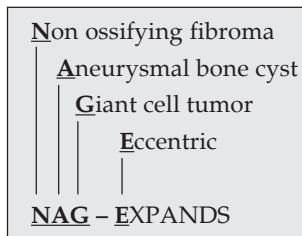
(AIIMS 1Nov 2007)

Most of the benign tumors and cartilagenous tumors are treated by surgery

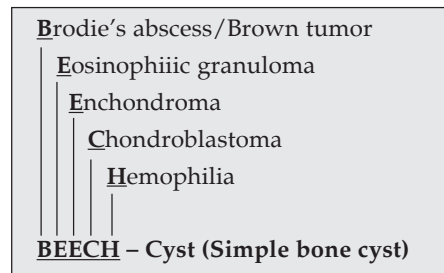
Osteosarcoma and cartilagenous tumors are radioresistant.

	Unicameral bone cyst	Aneurysmal bone cyst
Age	1st decade	2nd decade
Site	Proximal humerus, femur	Lower limb (however can occur anywhere)
Location	Central (concentric)	Eccentric
Expansile	Expansile	More expansile
Symptoms	Asymptomatic	Pain is present
Cavity	Single, Straw coloured fluid	Multiloculated, Haemorrhagic fluid
Treatment	Curettage	Extended Curettage

Eccentric expansile cysts



Central cysts (may be expansile)



Osteochondroma – Bony Growth with Cartilage Cap

- M.C. cause of pain is Bursitis over Osteochondroma
- Malignant transformation into chondrosarcoma (identified by MRI)
- *Treatment:* Extraperiosteal resection.

Osteoid Osteoma – M.C. Femur Diaphysis

- It is the commonest benign true bone tumor, exceeded in incidence only by osteochondroma and nonossifying fibroma.
- The typical patient with an osteoid osteoma has pain that is worse at night and is relieved by aspirin or other nonsteroidal antiinflammatory medications. When the lesion is in a vertebra, scoliosis may occur.
- CT is the best study to identify the nidus and confirm the diagnosis.
- D/D of osteoid osteoma is bone island.
- Surgical management involves removal of the entire nidus burr-down technique.
- Radiofrequency ablation is used for osteoid osteoma.

Enchondroma:

- Enchondroma-most common tumor of bones of hand.
- Multiple enchondromatosis is also known as Ollier disease.
- Maffucci's syndrome is Enchondroma, subcutaneous hemangioma and phlebolith.
- Malignant transformation to chondrosarcoma may occur in <2% in solitary cases, 30% in Ollier's disease and 100% in Maffucci's syndrome.
- Treatment is extended Curettage

Chondroblastoma/Codman's Tumor

Classic "chicken wire" calcification

GIANT CELL TUMOR

Most common site is distal femur

Although these tumors typically are benign, pulmonary metastases occur in approximately 3% of patients. Malignant giant cell tumors represent less than 5% of total GCT.

- Closest Giant Cell variant A.B.C and Non-Ossifying fibroma.

(AIIMS May 2011)

Treatment of GCT at common sites*:

• Lower end of femur	Excision with Turn-o plasty*
• Upper end of tibia	Excision with Turn-o plasty*
• Lower end of radius	Excision with fibular grafting
• Lower end of ulna	Excision*
• Upper end of fibula	Excision*

- Adamantinoma: Most common long bone affected Tibia
- Ameloblastoma most commonly affects mandible
- Please note that most common tumor of mandible is squamous cell carcinoma.

Fibrous Dysplasia

- McCune-Albright syndrome refers to polyostotic fibrous dysplasia, cutaneous pigmentation(café au lait spots), and endocrine abnormalities.(Precocious puberty).
- Mazabraud syndrome is polyostotic fibrous dysplasia with intra-muscular myxomas.

Tumor	Osteo Fibrous Dysplasia (Female)	Admantinoma (Male)	Fibrous Dysplasia (Female)
Site	Tibial Diaphysis + Fibula	Tibia (MC Long Bone)	Femur, Cranio facial area
Presentation	Swelling + Deformity	Swelling	Deformity
Biopsy	Trabecular Bone with Fibrous Stroma with osteoblasts	Epithelial Cells	Trabecular Bone with Fibrous Stroma
X-ray appearance	Soap Bubble ± ground glass	Soap Bubble	Ground glass

- Fibrous dysplasia of proximal femur has shepherd crook deformity

OSTEOSARCOMA

- Osteosarcoma may be more common in patients with the hereditary form of retinoblastoma and Li-Fraumeni syndrome.
- Pulsatile bone tumors in following order answer must be preferred

Osteosarcoma>ABC>Angioendothelioma of bone >GCT

(AIIMS May 2010, AIPG 2007)

(Amongst metastasis RENAL and thyroid pulsatile metastasis.)

- Chemotherapy + Limb Salvage Surgery + Chemotherapy (Methotrexate is most important)
- Etoposide is not included in the 'T-10'protocol for osteosarcoma
- Osteosarcoma is radioresistant.

(AIPG 2007)

Ewings sarcoma – Presentation like osteomyelitis

Classically, Ewing sarcoma appears radiographically as a *destructive lesion in the diaphysis* of a long bone (Femur) with an "onion skin" periosteal reaction.

Ewing sarcoma more often originates in the metaphysis of a long bone, but frequently extends for a considerable distance into the diaphysis. **Origin is from marrow cells.**

MIC 2 (CD 99) positive cells, glycogen positive cells **are seen in Biopsy.**

(AIIMS May 2012)

The **t(11; 22)** (q24; q12) is the most common translocation diagnostic of Ewing sarcoma and is present in greater than 90% of cases. Other diagnostic translocations, including **t(21; 22)** (q22; q12), **trisomy 8**, trisomy 12 t(7;22)(p22; q12), del 1 and t(17,22) (AIPG 2012)

Poor prognostic Factors are: Males age > 12, Fever, anemia, Increased TLC, platelets, LDH, Proximal lesion, chemoresistance, relapse and distant metastasis. **(Last 3 are worst prognostic factors).**

(AIIMS Nov 2010)

- Treatment of Ewing's Sarcoma – Chemotherapy followed by surgery followed by chemotherapy.

ABCD (Actinomycin D/Bleomycin /Cyclophosphamide/Doxorubicin) is chemotherapy

(Chemotherapeutic Regimen for Ewings sarcoma-involves age group when children learn ABCD)

Chondrosarcoma is most common tumor associated with Hyperglycemia.

(AIPG 2010)

Treatment of Chondrosarcoma is surgical excision.

Chordoma

Chordoma is rare malignant tumor originating from the remnants of primitive notochord. It commonly occurs in the sacrococcygeal or in the spheno-occipital regions. Sacrum is the most common site - Sacrum 50% clivus (35%), cervical thoracic/lumbar (15%).

> 40 multiple lesions in Bone diagnosis is metastasis > multiple myeloma.

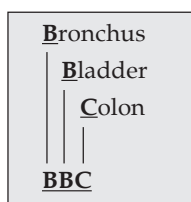
Elderly with bone pains increased ESR and hypercalcemia is multiple myeloma till proved otherwise.

Metastatic Bone Disease

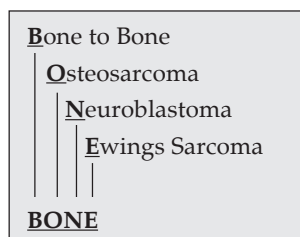
- Most common primary is Breast>Prostate overall
- **Most common sites of primary for bone metastasis.**
 - In males – Prostate > Lung
 - In Female – Breast > Lung
 - In Children – Neuroblastoma
- **Skeletal sites most frequently involved**
 - Spine (Lumbar)
- **Lytic expansile metastasis seen in**
 - Renal Cancer
 - Thyroid carcinomas
- Purely Osteoblastic secondaries
 - Prostate/Carcinoid/Medulloblastoma
- **Metastasis distal to knee and elbow is rare and usually arises from a primary tumors of the**
 - Bronchus, Bladder and Colon (BBC)

(AIIMS May 2009)

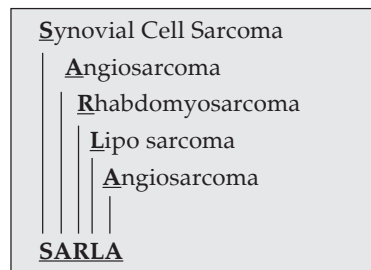
“BBC Can Go Anywhere even distal to Elbow and Knee”



Metastasis from Bone to Bone



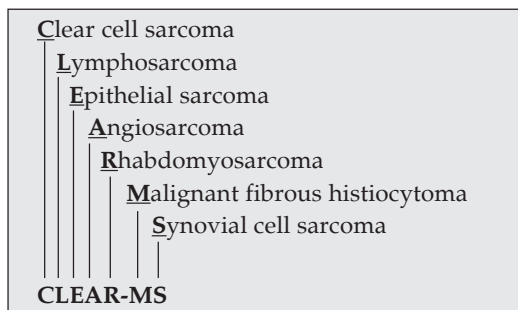
Soft tissue Sarcoma to Bone



Rhabdomyosarcoma is the most common soft tissue tumor in child.

Malignant fibrous histiocytoma is the most common soft tissue tumor in adult.

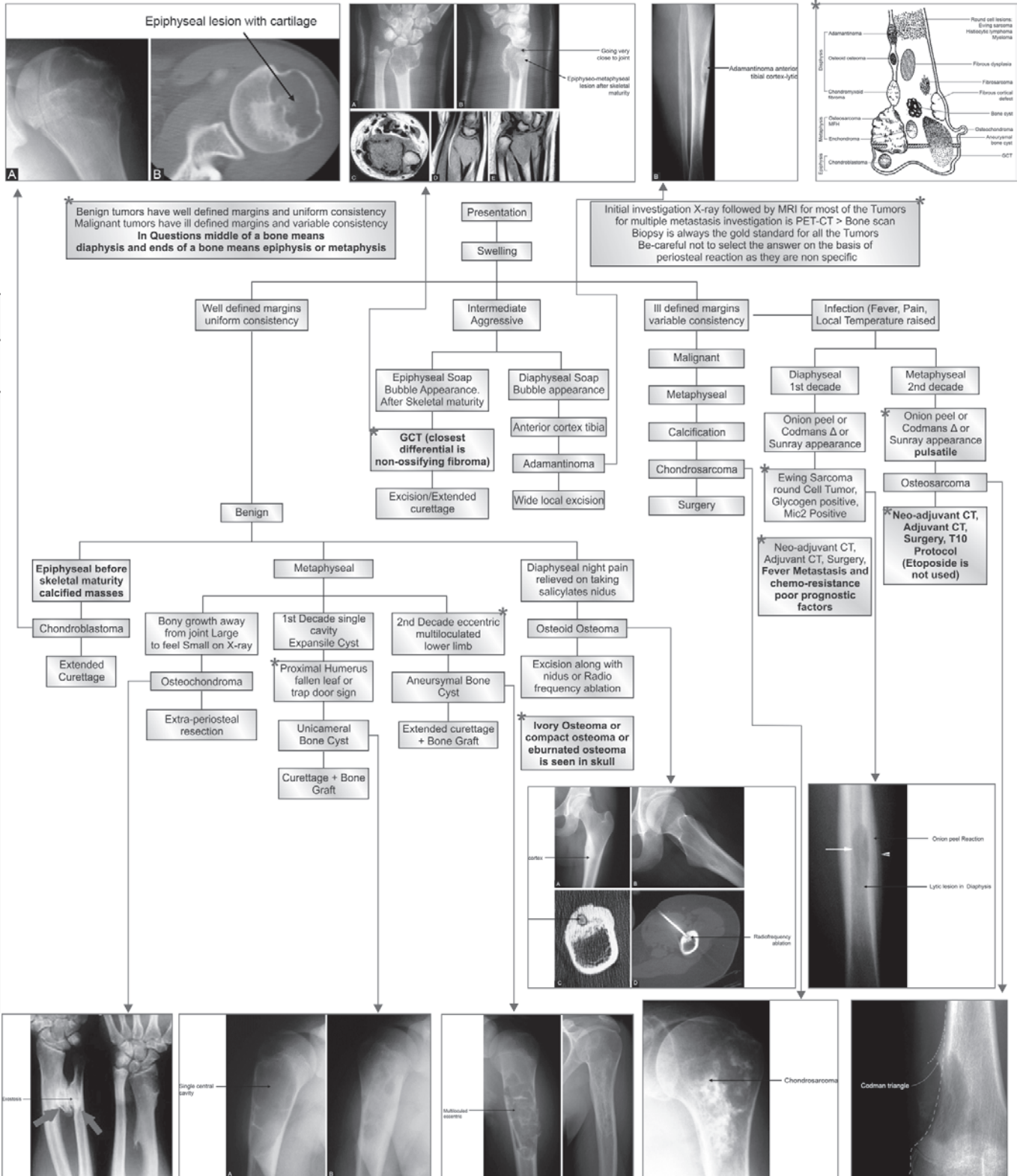
Sarcomas metastasizing through lymphatic and causing lymph node involvement are:



The term 'synovial cell sarcoma' is a misnomer as synovial cell sarcomas do not arise from synovium. (AIPG 2010)

Orthopedics Quick Review

1



* Latest Questions

5. FRACTURE AND FRACTURE HEALING

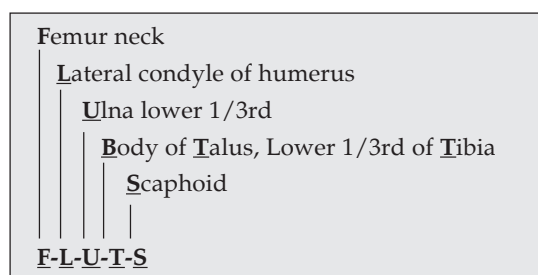
- **1st Centre of Primary ossification appears at end of 2nd month in intra-uterine life.** (AIIMS Nov 2011)
- Rate of mineralization of newly formed osteoid estimated by tetracycline labelling.
- Fracture, Partial or complete loss of continuity of cortex.
- Tenderness is the commonest sign of fracture.
- Abnormal mobility and Loss of transmitted movements *surest sign of fracture*
- **Direct trauma – Transverse > Comminuted fracture** (AIIMS May 2003)
- *Modelling* – Growing skeleton
- *Remodelling after Skeletal Maturity* – Resorption + Bone deposition (apposition)

Bone remodelling has both osteoclastic and osteoblastic activity at compression or tension site but the forces on bone decide where remodelling takes place compressible forces compression site and tensile forces tension site and in bone modelling there is osteoclastic activity at tension site and osteoblastic activity at compression site. (AIIMS May 2001)

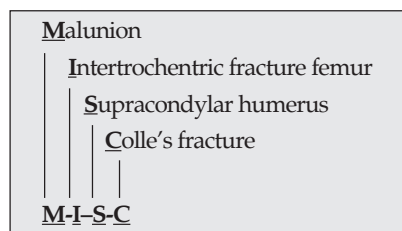
- **Bone apposition is seen in** (AIIMS Nov 2001)
Howship's lacunae or cutting cones in normal adults (After resorption)
Subperiosteal cambium layer In fractured bones (Best example of bone apposition) and after cancellous bone grafting. Bone apposition in these 2 examples does not require resorption.
- Markers of Bone formation
Serum bone specific alkaline phosphatase (AIPG 2007)
Serum osteocalcin (very important marker)
- **Marker of Bone Resorption** (PGI June 2008), (AIIMS May 2008)
Urine hydroxyproline
Serum tartrate resistant acid phosphatase (TRAP)

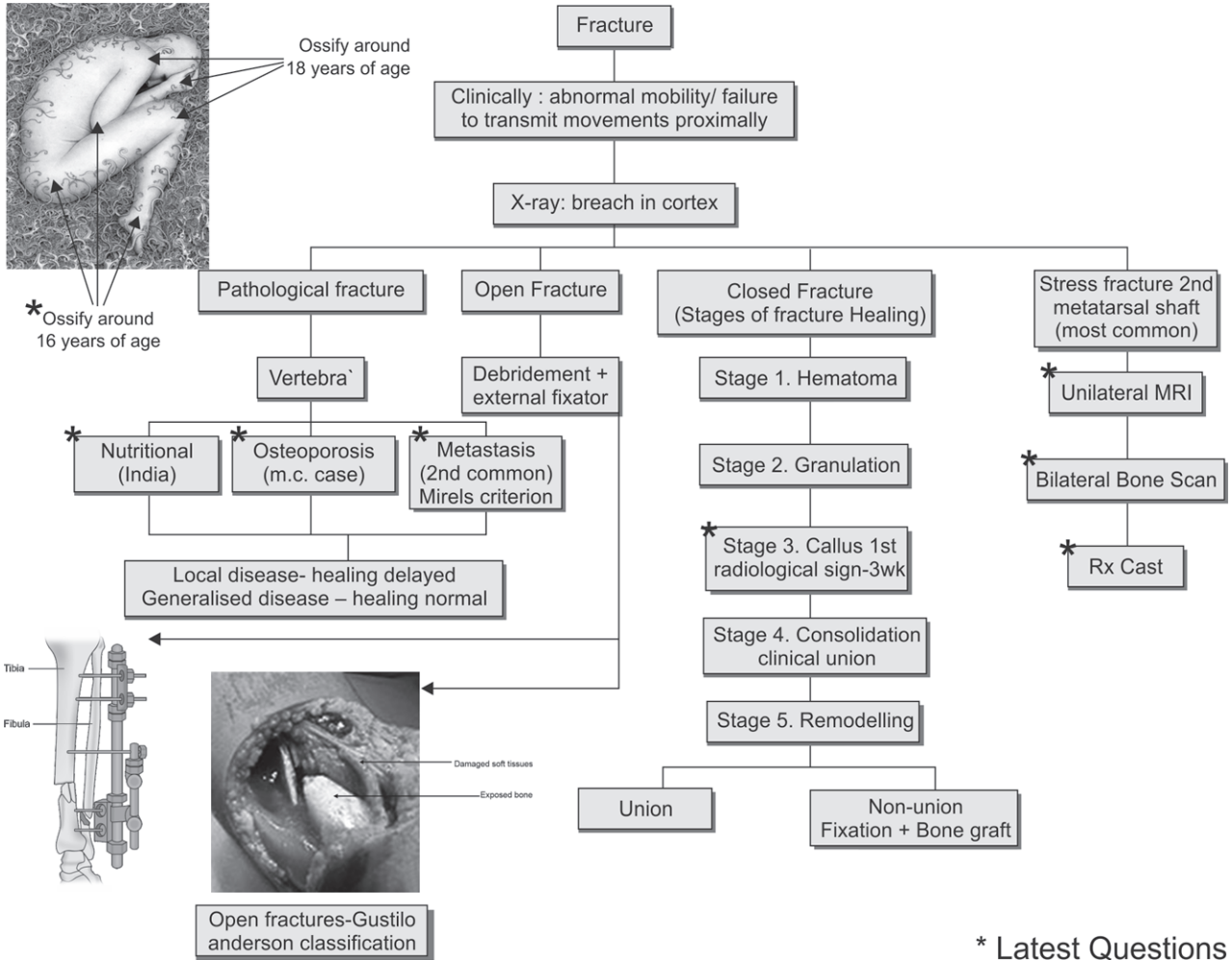
High oxygen tension, high pH (aiding alkaline phosphate activity) and stability (micromovement) predispose to osteoblasts hence enhances rate of union

Common Sites of Nonunion



Common sites of Malunion





* Latest Questions

6. ADVANCED TRAUMA LIFE SUPPORT

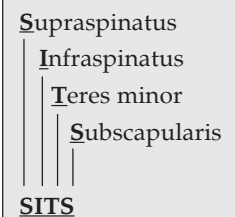
Any trauma patient should be managed in following sequent of events (ABCDEF) :

- Airway management with cervical spine stabilization (Cervical spine stabilization before Airway)
- Breathing (ventilation)
- Circulation
- Disability (neurological status) assesment
- Exposure and environmental control
- Fracture splintage

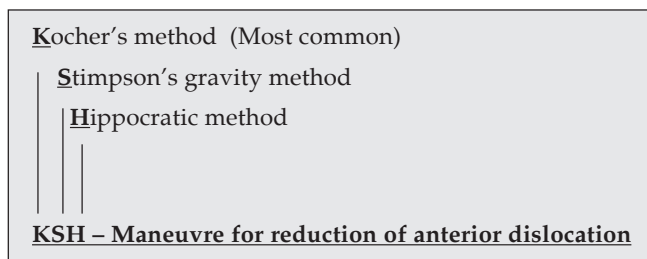
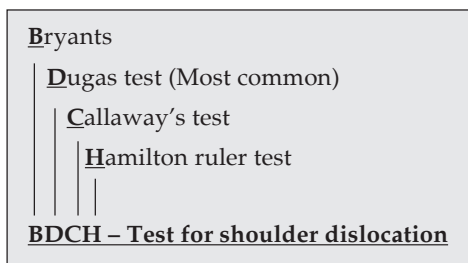
7. UPPER LIMB TRAUMATOLOGY

Shoulder

- Only one fourth of the large humeral head articulates with the glenoid at any given time. (2011)
- Four rotator cuff muscles are - supraspinatus, infraspinatus, subscapularis and teres minor.



3. **The inferior part of shoulder joint capsule is the weakest area.**
4. The tendon of the long head of biceps brachii muscle passes superiorly through the joint and restricts upward movement of humeral head on glenoid cavity.
5. **Rotator interval is interval between leading edge of supraspinatus and superior edge of subscapularis. Coracohumeral ligament passes with in rotator interval.** (AIIMS 2006)
6. Lift Off Test (Gerber's test) is done to assess the strength of subscapularis muscle. (AIIMS May 2012, AIPG 2010)
7. Traumatic detachment of the ANTERIOR glenoid labrum has been called the *Bankart lesion*. Excessive laxity of the shoulder capsule also causes instability of the shoulder joint.
8. **Hill-Sachs lesion is a defect in the posterolateral aspect of the humeral head-Anterior dislocation of shoulder**
9. **(RAMP)—Reverse Hill Sachs - Anteromedial humeral head -posterior dislocation of shoulder** (AIPG 2012)
10. Recurrent dislocation is most common in shoulder joint, accounting for nearly 50% of all dislocations. Most commonly subcoracoid type
11. **Recurrent Dislocation of Patella** (2nd most common)
12. **Rarest involved joint in Recurrent Dislocation – Ankle** (AIPG 2009)
13. Recurrent Anterior Dislocation -Abduction and External rotation force (AIIMS Nov 2011)



- Most common early complication of anterior dislocation of shoulder is AXILLARY nerve injury
- **Inferior dislocation also axillary nerve is involved.**
- Anterior instability test: Anterior apprehension test, Fulcrum test, Crank test surprise test.
- **Jerk test is for posterior instability** (AIIMS May 2010, AIIMS May 2009)
- Sulcus test for inferior instability (multi-directional instability)
- Clavicle is the most common fractured bone (over all) in adults.
- Clavicle is the most common bone fractured during birth.
- The weakest point of midclavicle is the junction of middle and outer third (i.e. medial 2/3rd and lateral 1/3rd).
- Sling immobilization/Figure of eight bandage rarely plating or K wire fixation.
- Malunion is the most common complication.

Valpeau bandage (dressing) is used in acromioclavicular dislocation, fracture clavicle and shoulder dislocation but it is most effective in acromioclavicular dislocation as it pushes lateral end of shoulder down wards and arm upwards, and thus helps maintaining reduction. (AIIMS Nov 2008)

Fractures of Surgical Neck Humerus

Elderly osteoporotic females are usually involved.(in such cases it is usually impacted)

Peripheral nerve injuries are common, especially involving the axillary nerve.

Analgesics with arm sling usual treatment

Injury	Common Nerve Involvement
Anterior or inferior shoulder dislocation	Axillary, (circumflex humeral) nerve
Fracture surgical neck humerus	Axillary nerve
Fracture shaft humerus	Radial nerve
Fracture supracondylar humerus	AIN > Median > Radial > Ulnar (AMRU)
Medial condyle humerus	Ulnar nerve
Monteggia fracture dislocation	Posterior interosseous nerve
Volkman's ischemic contracture	Anterior Interosseous Nerve
Lunate dislocation	Median nerve
Hip dislocation	Sciatic nerve
Knee dislocation	C. Peroneal nerve

Humerus shaft fracture; The most common cause of delayed union or nonunion is distraction at fracture site due to gravity and weight of plaster. A spiral fracture of the distal third of the humerus is called a Holstein-Lewis fracture. It is frequently associated with radial nerve palsy. Plating for treatment (usually)

Elbow Ossification

- **C** – Capitellum 2 years – Appear sequentially every 2 years
- **R** – Radius head 4 years – Appear sequentially every 2 years
- **I** – Internal (medial) epicondyle 6 years – Appear sequentially every 2 years
- **T** – Trochlea 8 years – Appear sequentially every 2 years
- **O** – Olecranon 10 years – Appear sequentially every 2 years
- **E** – External (Lateral) epicondyle 12 years – Appear sequentially every 2 years

Three point bony relationship is not disturbed in fracture supracondylar humerus as the fracture occurs above the level of these bony landmarks and Classically Disturbed -Dislocation of elbow (Classical example)

Age

1. Lower humeral epiphyseal slip: 1-3
2. Supra condylar humerus fracture: 5-8 years
3. Lateral condyle humerus fracture: 5-15 years

Fractures of necessity (requiring surgery)

1. *Lateral condyle fracture humerus*
2. *Displaced fracture olecranon and patella*
3. *Fracture neck femur*
4. *Galeazzi fracture dislocation*
5. *Monteggia fracture in adults*
6. *Articular fractures*

Fracture lateral condyle Humerus – Treatment is Open reduction + K-wire fixation

- Complications of fracture lateral condyle humerus are
- Nonunion –cubitus valgus(Treatment Milch osteotomy)
- Malunion cubitus varus(Treatment Modified french osteotomy)
- Tardy ulnar nerve palsy(Treatment Anterior Transposition of ulnar nerve)
- Growth disturbances

Fracture Supracondylar Humerus

Supracondylar humeral fractures in children are most common elbow injuries, especially in children aged 5-8 years. Most common type of supracondylar fracture -Extension type (~98% of all supracondylar fracture).

Supracondylar humeral fractures are extra-articular with posterior displacement of the distal fragment.

Medial (Internal) rotation/ Medial tilt/ Medial or lateral shift

Impaction (proximal shift)

Dorsal displacement/ Dorsal tilt

MID – displacement in supracondylar fracture humerus

Associated nerve injuries most commonly involves anterior interosseous branch of median nerve

Anterior interosseous nerve

Median nerve

Radial nerve

Ulnar nerve (in flexion type)

AMRU (Order of Nerve Involved)

(AIPG 2011)

1

Treatment is closed reduction and cast if it fails or if fracture is displaced the fracture is fixed with K wires

Malunion – Cubitus varus (gun stock deformity) ~ Treatment modified French Osteotomy.

Baumans Angle-angle between the physis and long axis of humerus normal value 75 to 90 degrees it is increased in cubitus varus.

Fracture supracondylar humerus is:

Most common fracture associated with vascular injury.

Most common fracture to involve brachial artery. (10% cases)

Most common cause of volkman's ischemia and compartment syndrome in children.

Most common cause of volkman's ischemic contracture

Side swipe injury-open fracture dislocation of elbow seen due to accidents involving side swipe over elbow .

Compartment Syndrome-Tight cast think of compartment syndrome !

Compartment syndrome involves deep posterior compartment of leg>deep flexor compartment of forearm (commonest in children).

Clinical Feature

- The diagnosis of compartment syndrome is based on dramatically increasing pain (out of proportion to injury) after fracture/ any injury (1st symptom)
- **Pain and resistance on passive extension of fingers (Distal most joint of extremity) (1st sign) "Stretch Pain"**
- **Pulse is not a reliable indicator**
- **Deep flexor muscles are involved particularly flexor digitorum profundus>Flexor Pollicis Longus.(AIIMS May 2012)**
- Fasciotomy is recommended for impending tissue ischemia when the tissue pressure reaches 30 mm Hg or the difference between diastolic blood pressure and compartment pressure is less than 30 mm of Hg or neurovascular sign appear.

Volkman's Ischaemic Contracture(VIC) – Most commonly involve deep flexor compartment of forearm (FDP > FPL)

The earliest nerve involved is Anterior interossei>median>ulnar.

Turn Buckle splint

Max Page Muscle Sliding Operation

Myositis Ossificans / Hetrotropic Ossification-History of Massage think of it !

Elbow > hip joint.

In elbow More commonly anteriorly than posterior

Trauma around elbow eg. fracture supracondylar humerus, dislocation or surgery.
Surgical trauma specially total hip replacement,.

Parameter	Myositis Ossificans	Tumor Calcinosis
Etiology	Traumatic	Idiopathic/Familial
Side/Site	Unilateral-Elbow	Bilateral-Knee
Symptom	Painful	Painless
Marker	ALP Levels Increased	PO ₄ Levels Increased

Treatment Of Myositis Ossificans

30% of cases resolves spontaneously

In acute phase the treatment consist of limiting motion x 3 weeks.

Followed by only active exercises upto 1 year

Surgical excision > 1 year

Low dose irradiation, bisphosphonates and indomethacin may prevent hetrotopic ossification, but the radiation should be avoided in children.

Pulled Elbow/ Nurse Maid's Elbow – “Age 1 to 4 yrs and forearm is pronated”

It is subluxation of radial head or more accurately subluxation of the annular (orbicular) ligament which slips up over the head of radius and is reduced by forceful supination.

Fracture Olecranon treatment is Tension Band wiring or rarely excision which is contraindicated if Fracture is extending to coronoid process

Monteggia Fracture Dislocation

Fractures proximal third of the ulna with dislocation of proximal radioulnar joint. Posterior interosseous nerve injured because it takes a turn around radial head and injured with its dislocation.

Galeazzi Fractures of the Distal Third of the Radius with Dislocation of the Distal Radioulnar Joint

Fracture both bone forearm is treated in children with cast and in adults with plating

Position of immobilization is midprone in fracture both bone forearm (mid 1/3)

Night stick fracture is isolated fracture of ulna due to direct blow.

Colle's Fracture – (Extra-articular)

Colle's fracture is fracture of lower end of radius at its cortico cancellous junction

Supination

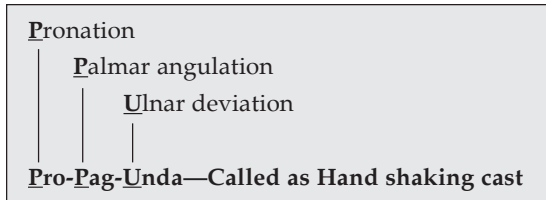
| Lateral displacement/Lateral tilt angulation

| Impaction (Proximal shift)

| Posterior displacement/Posterior tilt/angulation

SLIP – (Displacement in Colle's)

Most colles fractures can be successfully treated nonoperatively and cast is applied on opposite forces to displacement-
That's why position of immobilization in colle's fracture is



Complications of colles

Finger stiffness is most common complication.

Malunion is the 2nd most common complication and it leads to dinner fork deformity

Sudeck's Osteoneuro Dystrophy/Reflex Sympathetic Dystrophy /Causalgia/ Algodystrophy/ Complex Regional Pain Syndrome. Red Hot skiny skin, severe pain.

- CRPS type I is a regional pain syndrome that usually develops after tissue trauma eg colles (AIPG 2011)
- CRPS type II is a regional pain syndrome that develops after injury to a peripheral nerve,Median>Sciatic(Tibial trunk)
- Treatment is usually physiotherapy and results are poor.
- Reflex Sympathetic Dystrophy- Patchy Osteopenia
- Hyperparathyroidism- **Generalised** Osteopenia
- Tuberculosis- **Disuse** Osteopenia

Barton's Fracture – A fracture dislocation in which the carpus and a rim of distal radius are displaced together.

Chauffeur's Fracture – A radial styloid fracture.

Relative Incidence of Carpal Bone Fractures Scaphoid > Triquetral >Trapezium

Scaphoid: Middle third (Waist) fractures are most common. Distal pole avulsion type fracture is most common fracture type in children.

Sign – Tenderness in anatomical snuff box. **Oblique view important for diagnosis.**

MRI can diagnose occult fractures.

Treatment is glass holding cast if does not unite or markedly displaced fracture Headless screw is used.

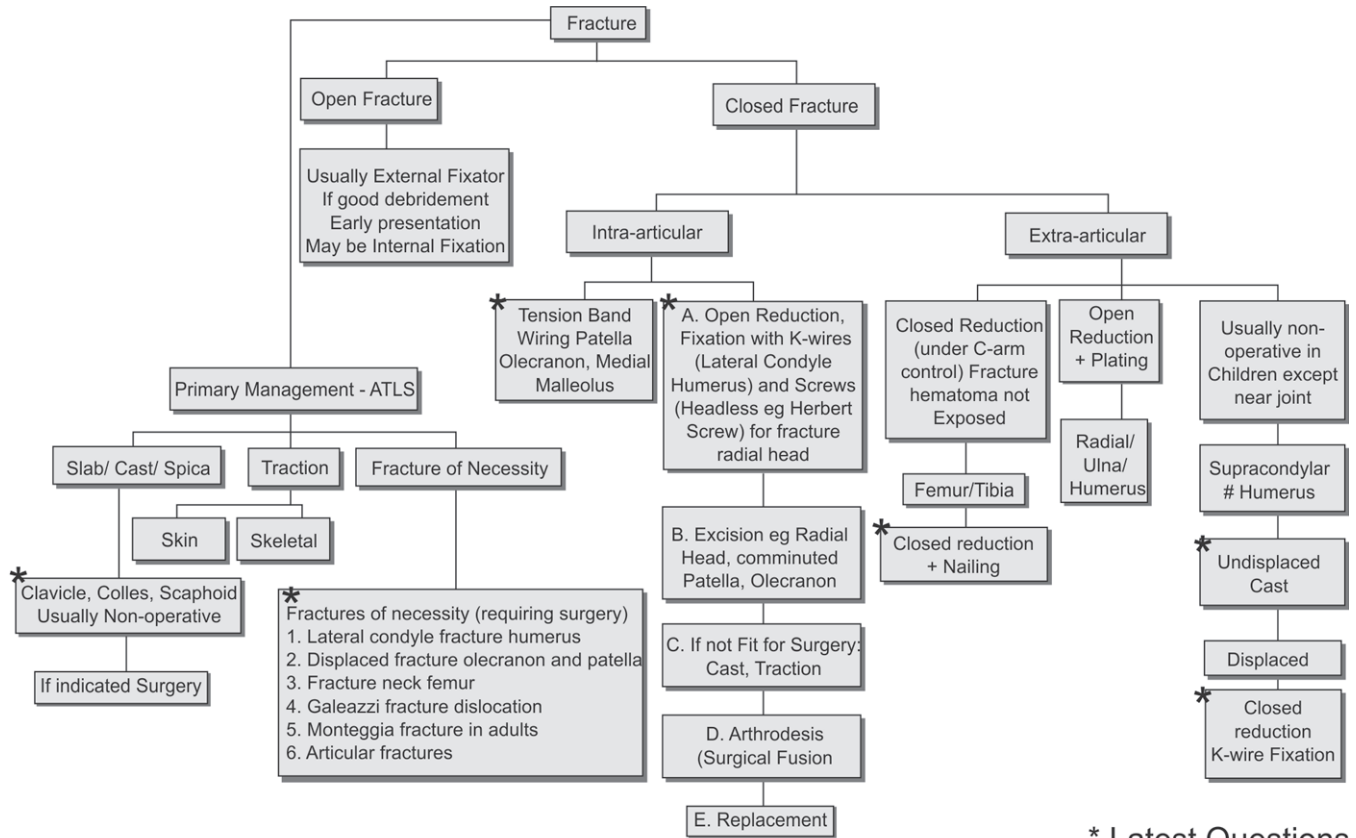
Scapholunate dissociation ~ Terry Thomas sign.

Bennett Fracture-Intraarticular Fracture of base of 1st metacarpal with dislocation of carpometacarpal joint

Rolando fracture –comminuted intraarticular fracture of base of 1st metacarpal

Injuries with characteristic deformities:

Deformity	Injury
Flattening of shoulder	Shoulder dislocation (anterior)
Dinner-fork deformity	Colles' fracture
Garden-Spade Deformity	Smith Fracture
Mallet finger	Avulsion of the insertion of the extensor tendon from distal phalanx
Flexion, adduction and internal rotation of the hip	Posterior dislocation of the hip, arthritis
Flexion, abduction, external rotation of the hip	Anterior dislocation of the hip, septic hip synovitis of hip joint/Fluid and Iliotibial Band Contrature (Polio)
External rotation of the leg	Fracture neck of femur Trochanteric fracture (Lat border of foot touching bed)



* Latest Questions

8. SPINAL INJURY

Vertebroplasty is percutaneous injection of bone cement (PMMA = polymethyl methacrylate) into vertebral body. It can be used for osteolytic spinal metastasis, multiple myeloma, aggressive hemangiomas, vertebral compression fractures (Osteoporotic). Its use is **contraindicated in infections, Tuberculosis**. (AIIMS May 2011)

Vertebroplasty prevents further collapse and kyphoplasty is correction of collapse of vertebra by using high pressures it is not preferred now.

- Central Cord Syndrome-Motor weakness with arm weakness out of proportion to leg weakness

Areflexic bladder bower and lower limbs

- With Symmetrical involvement – Conus medullaris Syndrome
- Asymmetrical involvement – Cauda equina syndrome

Cervical spines has highest chances of dislocation without fracture as their zygapophyseal (facet) joints slope in almost antero posterior horizontal plane. Where as in thoracic and lumbar region facet joints are oriented vertically and inter locked.

Whiplash Injury

Hyperextension of lower cervical spine

Jefferson's Fracture

Jefferson fracture is burst fracture of ring of atlas (C1) vertebrae

Burst fracture is a vertical compression fracture.

(AIPG 2007)

Hangman's Fracture

It occurs when a fracture line passes through the neural arch of the axis (C_2) vertebrae **traumatic spondylolisthesis of axis (C_2) vertebrae on C_3 – H_2 (Hangmans involves 2ND Cervical Vertebra).**

NOTE: C_1 and C_2 injuries usually do not cause neural deficit because of wide spinal canal here.

Flexion rotation injury is the most common spinal injury followed by compression extension injury (2nd most common).

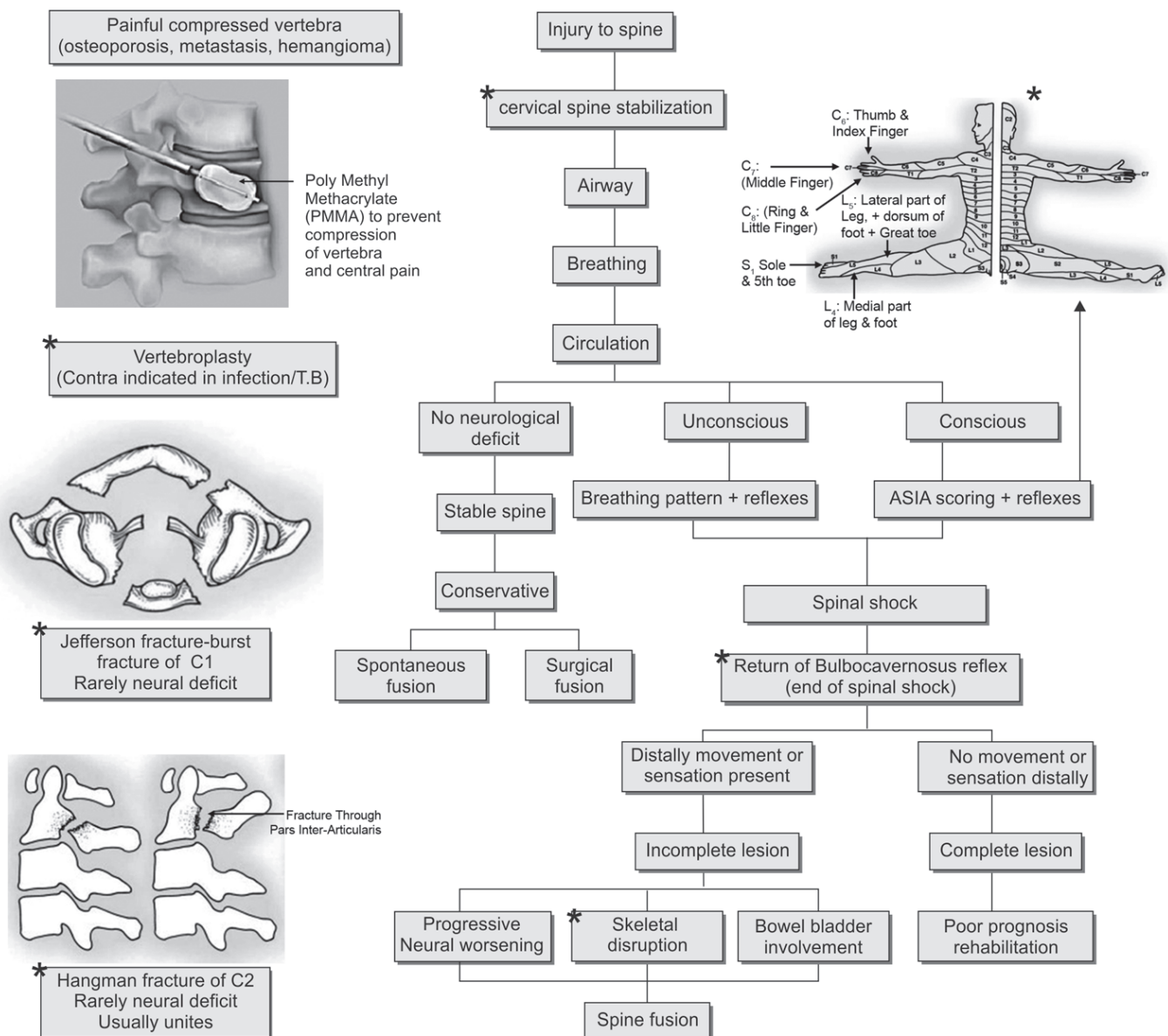
(AIPG 2007)

Tear drop fracture is caused by combined axial compression and flexion injury.

Patient with head injury, unexplained hypotension warrants evaluation of Lower cervical spine > Thoracic spine

In axial load injuries (compression injuries), the most common site of trauma is at the thoracolumbar junction

Car seat belt injury causes chance fracture



LEVEL OF INJURY

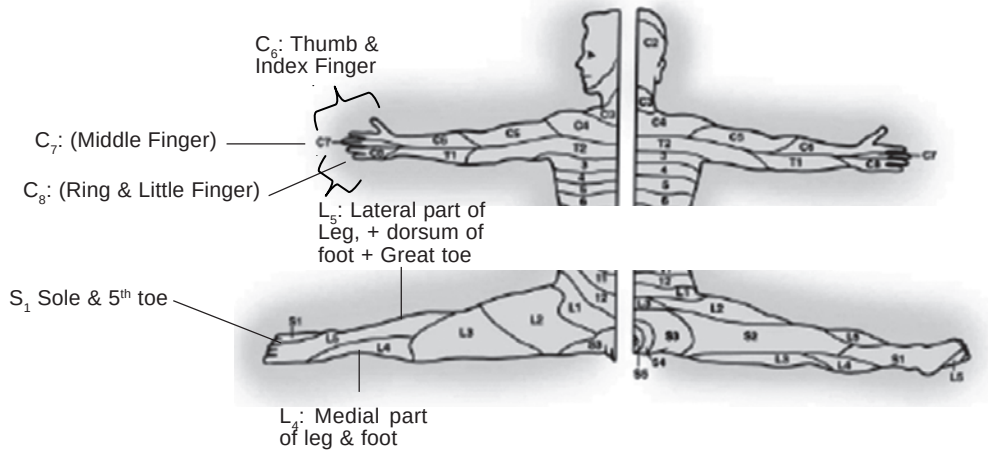


Fig. 1.1: Dermatomes (Sensory S supply)

Nerve Root	Muscle group used for motor grading in ASIA system	Other Motor	Sensory	Reflex
C5	Elbow flexion (Biceps, Brachialis)	Deltoid* (arm abduction)	Lateral shoulder Lateral arm	Biceps
C6	Wrist extension (extensor carpiradialis longus and brevis)		Thumb and index fingers	Brachio radialis
C7	Elbow extensor (triceps)	Extensor digitorum* (finger extensor) Wrist flexion	Middle finger	Triceps
C8	Finger flexors (flexor digitorum profundus)/		Ring and little fingers	
T1	Hand intrinsics (interossei) Finger abduction		Upper anterior forearm	
L2	Hip flexors (iliopsoas)		Upper anterior thigh	
L3	Knee extensor (quadriceps)	Thigh (hip) adduction	Lower anterior thigh Anterior knee	(knee)
L4	Ankle dorsiflex or (tibialis anterior)	Quadriceps* (knee extension) Hip adduction	Medial calf, medial border of foot	(knee)
L5	Great toe extensors (extensor hallucis longus) EHL	Peronei (foot eversion) Tibialis anterior (ankle dorsiflexion) Gluteus medius (hip abduction), Knee flexion Toe dorsiflexors	Dorsal surface foot Lateral calf Great toe all aspects	
S1	Ankle plantar flexors (gastrocnemius and soleus)/FHL (Flexor Hallucis Longus)	Abductor hallucis Gluteus — maximus (hip extension)	Plantar surface foot Lateral aspect foot including 5 th toe all aspects	ankle reflex

*ASIA: American Spinal Injury Association.

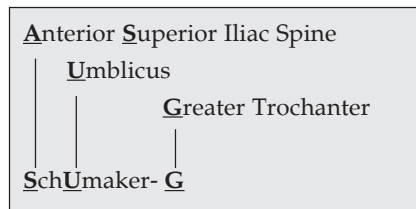
MEASUREMENT OF SUPRATROCHANTERIC SHORTENING

Shortening of limb length produced above the level of trochanter (due to femoral head, neck and hip joint lesions) is known as supratrochanteric shortening. And it is measured by following tests.

Qualitative Assessment

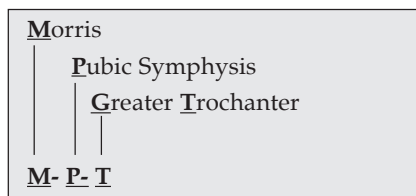
Patient lies supine and hip is extended

Schoemaker's Line SchUmaker- G



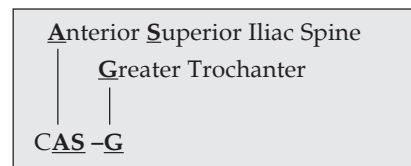
A line joining tip of trochanter and ASIS, when prolonged on both side, should meet in the central line at or above the umbilicus. In case of proximal migration of greater trochanter the line on that side will meet its counter part below the umbilicus and on the opposite side.

Morris's Bitrochanteric Test M - P - T



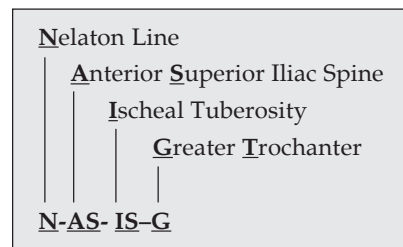
- The distance from the tip of the trochanter to the pubic symphysis should be equal.
- If trochanter is externally rotated or displaced back distance will increase on that side and viceversa. In central fracture dislocation that side component is reduced.

Chiene's Parallelogram CAS -G



- The lines joining the two ASIS and two tips of trochanter should be parallel.
- In case one of the greater trochanter has moved proximally the lines will converge on that side.

Nelaton's Line: Patient lies on the normal/opposite side of the limb with preferably 90° flexion at hip. A line drawn from ischial tuberosity to ASIS should pass through the tip of greater trochanter. In case of supratrochanteric shortening the trochanter will be above this line.



Quantitative Measurement

Bryant's Triangle

- The patient lies supine and tips of trochanter and ASIS are marked on both sides.
- A perpendicular is dropped from each ASIS on to the bed. From tip of greater trochanter another perpendicular is dropped on to the first one, (**base of the triangle**). Now join the tips of greater trochanter to ASIS on respective side. Each side of this right angled triangle is compared with its counter part on the normal side.
- Any shortening of the base (i.e. more or less femoral axis continuation line), which may be because of shortening in the neck, head, joint or dislocation of joint can be measured.

TRENDELENBURG SIGN

Normally when the body weight is supported on one limb, the glutei (medius and minimus) of the supported side contract and raise the opposite and unsupported side of pelvis, if the abductor mechanism is defective the unsupported side of pelvis drops and this is known as positive trendelenburg's test.

Trendelenberg's test is done to assess the integrity of abductor mechanism. It is positive in the conditions in which any of the three — fulcrum(Femoral Head), lever arm (neck length) or power (muscles/nerve)is affected .

Causes of Positive Trendelenberg Test

Power-Paralysis of abductor muscles

- Superior gluteal nerve palsy (supply gluteus medius and minimus)
- Polio
- Iliotibial tract palsy
- **Abductors of hip** are - Gluteus medius and minimus (main)
- Tensor fascia lata and sartorius (accessory)

Decreased lever arm

- Fracture neck femur

Absence of stable Fulcrum about which the abductor muscles can act dislocation of hip. Destruction of femoral head as in Perthes disease, AVN, late stages of TB hip(stage 4 and 5) and septic arthritis.

Tuberculosis of Hip- Trendelenberg's test may be positive in TB hip only in late stages(stage 4 and 5) when the head of femur is destroyed.

Patients walk with positive trendelenbrug sign on. **One hip-** Lurching/Trendelenburg Gait and **Both hip-** Waddling Gait
Thomas test – to measure fixed flexion deformity of hip by neutralizing lumbar lordosis. **Upto 30 degree flexion deformity of hip can be compensated by lumbar lordosis.**

Shenton's line is an imaginary semicircular line joining the medial cortex of femoral neck to the lower border of superior pubic ramus.Its femoral part is of more significance. It is breeched in fracture neck femur, head femur, superior pubic rami and dislocation of hip.

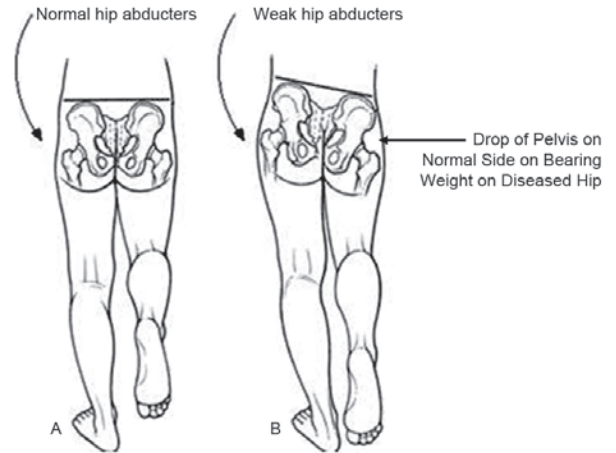


Fig. 1.2: Trendelenberg Test

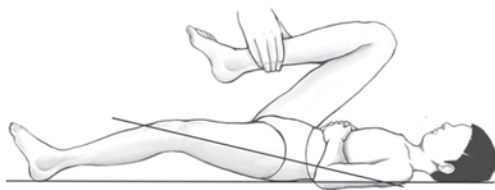


Fig. 1.3: Thomas Test to Assess Hip Flexion

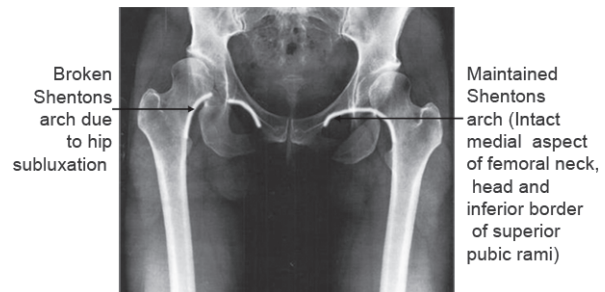


Fig. 1.4: X-ray Pelvis

Telescopic Test

In supine position, hip and knee are flexed as much as 90 degrees and thigh is pulled up and pushed down. Even in normal condition a slight amount of excursion of trochanter can be felt by other hand. If excursion is more, then this indicates instability of hip joint such as: old unreduced posterior dislocation ,loss of neck and or head in old fractures neck femur and paralytic hip.

Pelvic Fracture

In pelvis fracture intrapelvic haemorrhage is by far, the most serious complication. Haemorrhage frequently results from fracture surfaces. Amount of blood loss is around 4 – 8 units.

Tiles classification for fracture acetabulum

- A. Stable
- B. Rotationally unstable but vertically stable; and
- C. Rotationally and vertically unstable. This classification is widely used in the current literature.

Crescent Fracture, is a type II lateral compression injury that extends from posterior iliac crest, passing through iliac wing (just behind gluteal pillar), and may then exit in greater sciatic notch or more commonly may enter the sacroiliac (SI) joint. Treatment is operative. (AIIMS May 2009)

Straddle Fracture

Bilateral fracture of both pubic rami

Malgaigne Fracture

Fracture of pubis with a fracture of ilium near sacroiliac (SI) joint (Ipsilateral)

Kocher - Langenbeck (K - L) Approach Posterolateral approach to hip has good posterior exposure but limited superior and anterior exposure. Incidence of sciatic nerve injury is 2-6%.

Contraindicated in Morel – Lavallee lesion

(AIIMS May 2009 Nov 2009)

Fracture Around Hip

MRI is more sensitive(100% sensitivity) and specific for diagnosis of occult fracture neck femur.

Gardens classification for fracture neck femur

1. Stage 1 : The fracture is *incomplete*, with head tilted in postero-lateral direction, i.e. into valgus, therefore is known as *valgus (abduction) impacted fracture*.
2. Stage 2 : Complete fracture but undisplaced.
3. Stage 3 : Complete fracture with partial displacement.
4. Stage 4: Complete fracture with total displacement.

Pauwel's angle is the angle formed by the line of fracture with the horizontal plane

Deformity of hip

- Flexion, abduction, external rotation, apparent lengthening Synovitis
- Flexion, adduction. internal rotation, true shortening arthritis/posterior dislocation
- Flexion, abduction, external rotation, true lengthening-anterior dislocation
- External rotation, shortening-femoral neck fracture
- Marked external rotation, shortening-intertrochanteric fracture femur

Fracture Neck of Femur – Treatment

<65 years, < 3 week

- Closed reduction and internal fixation with multiple screw is the treatment of choice. In basicervical fracture Dynamic Hip Screw can be done .
- If closed reduction is not possible open reduction and screw fixation is indicated

<65 years, > 3 week fracture osteotomy/Bone grafting + fixation.

>65 years

- No pre-existing arthritis – hemiarthroplasty
- Pre-existing arthritis—total hip replacement

Complication are Osteonecrosis > Nonunion > arthritis

(AIPG 2012)

Chances of AVN and nonunion in decreasing order is

- Subcapital > transcervical > basal > intertrochanteric
- Transphyseal > transcervical > cervicotrochanteric > intertrochanteric (in children)

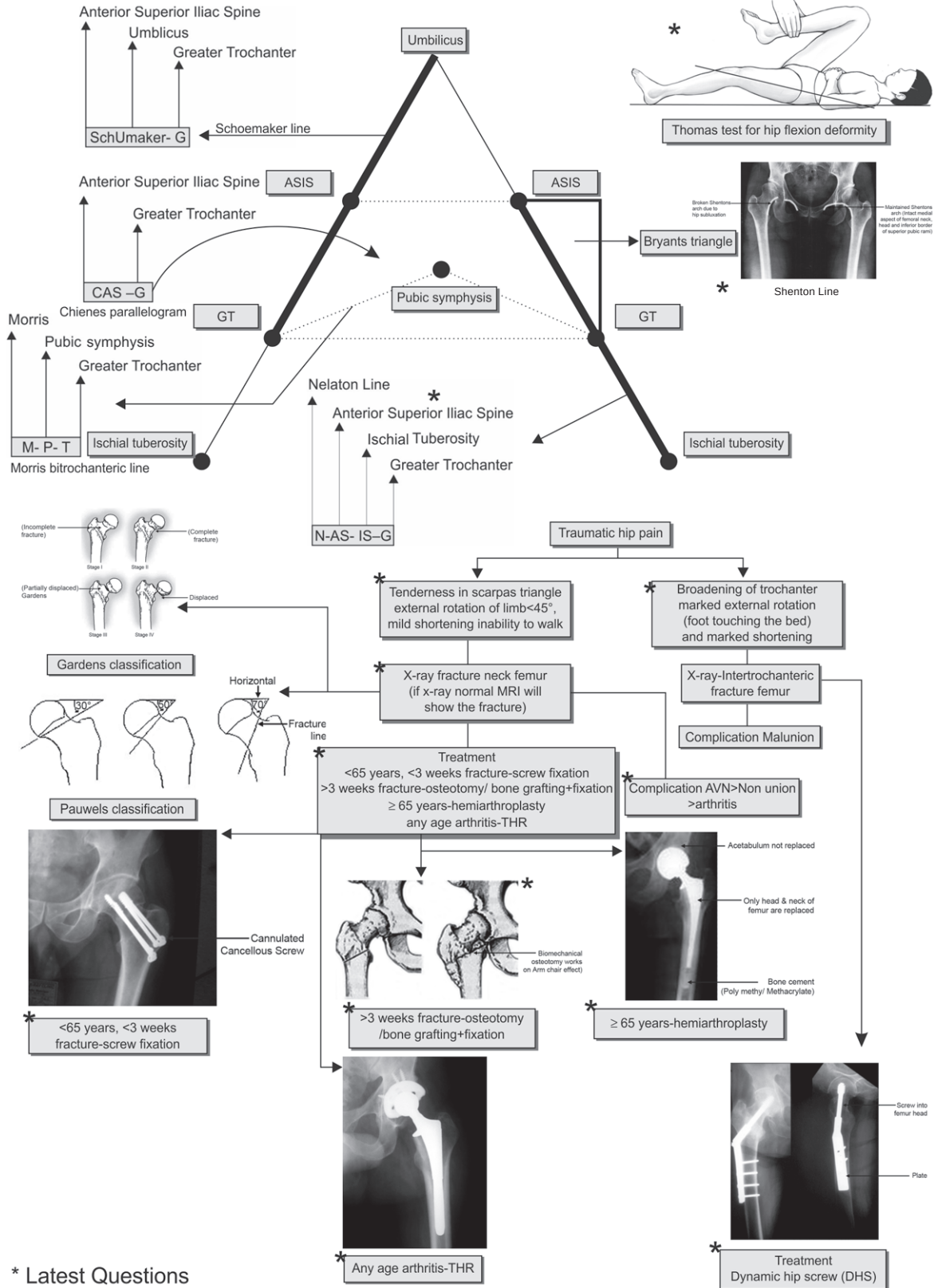
Intertrochanteric fracture femur

- Extra age, extra pain, extra shortening extra external rotation(as compared to Neck femur)
- Treatment of choice Dynamic Hip Screw
- Most common complication is malunion

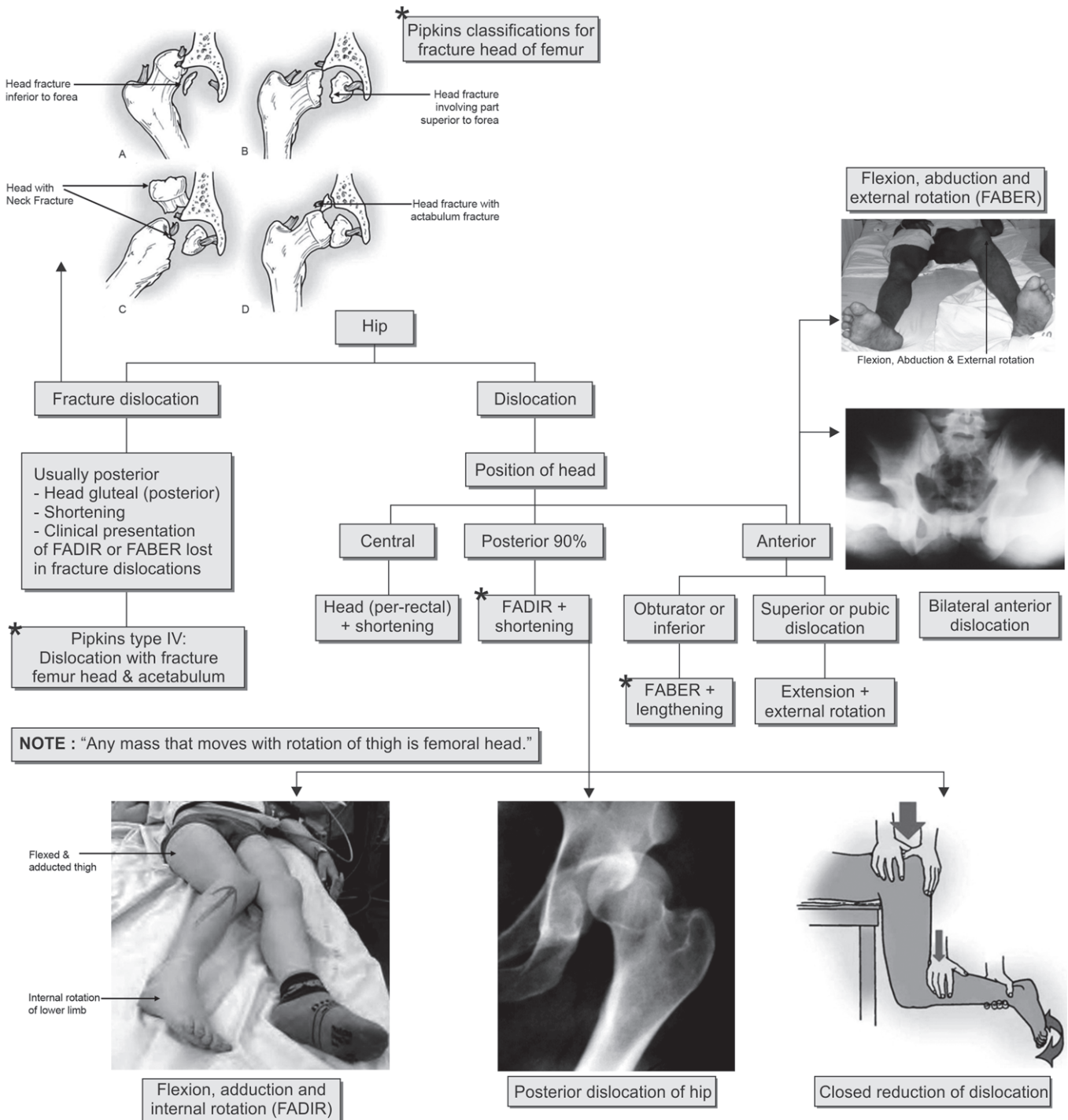
Most common dislocation of hip is posterior.

Associated fracture with dislocations do not have the classical deformities.

(AIPG 2012)



* Latest Questions



* Latest Questions

10. LOWER LIMB TRAUMATOLOGY

Subtrochanteric Femoral Fractures

- Russell and Taylor classification
- Treatment of choice is cephalomedullary nail
- **Smith Paterson** triflanged **nail was used** for internal fixation of fracture neck femur (not subtrochanteric femur).

Displacements In Fracture Shaft Femur

- *Proximal third fracture:* Proximal fragment flexes, abducts and externally rotates because of gluteus medius and iliopsoas

Diagnostic Criterion for Fat Embolism – Fracture shaft femur with breathlessness after 48 hours think of it:

1

Gurd's Major Criteria (4)

- Axillary or subconjunctival petechia
- PaO₂ below 60 mmHg
- CNS depression
- Pulmonary oedema

Gurd's Minor Criteria (8)

- Tachycardia
- Pyrexia
- ANEMIA
- Thrombocytopenia
- Fat globules present in sputum
- Fat present in urine (GURD TEST)
- Increasing ESR
- Emboli present in retina

1 major +4 minor = fat embolism

- Treatment of fat embolism is oxygen and (IPPV)

Patella:

- Displaced Transverse Fracture
 - Tension Band wiring by k-wires and stainless steel (SS) wire
- Comminuted Fracture
 - At least proximal third of patella is intact -Partial Patellectomy
 - Severe Comminution -Total Patellectomy

Management of Fracture Tibia

- Children –Above knee cast
- Adults – Trial of conservative management is given if it fails Interlock nailing.

Compartment syndrome of Leg – Test for toe dorsiflexion

(AIIMS Nov 2008)

Use of Single Crutch – In the opposite side for Fracture both bone leg and Hip Pathology

Over 90% of ankle ligament injuries (twisted ankle or ankle sprain involve the lateral ligament complex usually the anterior talofibular ligament)

Malleolar Fracture

- The three malleoli are medial malleolus, lateral malleolus and posterior malleolus (the posterior part of the lower articulating surface of tibia).
- The mechanism of injury first word is position of foot and second word the direction of force
- The most common mechanism is supination-eversion (supination-external rotation). so supination is position of foot and external rotation direction of injury.
- Treatment is maintain the joint surface reduced.

Tibial Pilon Fracture

The terms *tibial plafond fracture*, *pilon fracture*, and *distal tibial explosion fracture* all have been used to describe intraarticular fractures of the distal tibia.

Fracture Talus-Complications – OA > AVN

- Secondary Osteoarthritis of ankle and/or subtalar joint occurs some years after injury in over 50% of patients. There are several causes: articular damage because of initial trauma, malunion, distortion of articular surface and AVN.
- Avascular necrosis of body, incidence varies with the severity of displacement: in type I <10%, in type II ~40%, in type III >90% and in type IV 100%

Calcaneum is the most commonly fractured tarsal bone-Tuber angle of Bohler (Tuber-joint angle) –Reduced in fracture calcaneum and Crucial angle of Gissaine- increases in intraarticular fractures. (AIIMS May 2007, AIPG 2007)

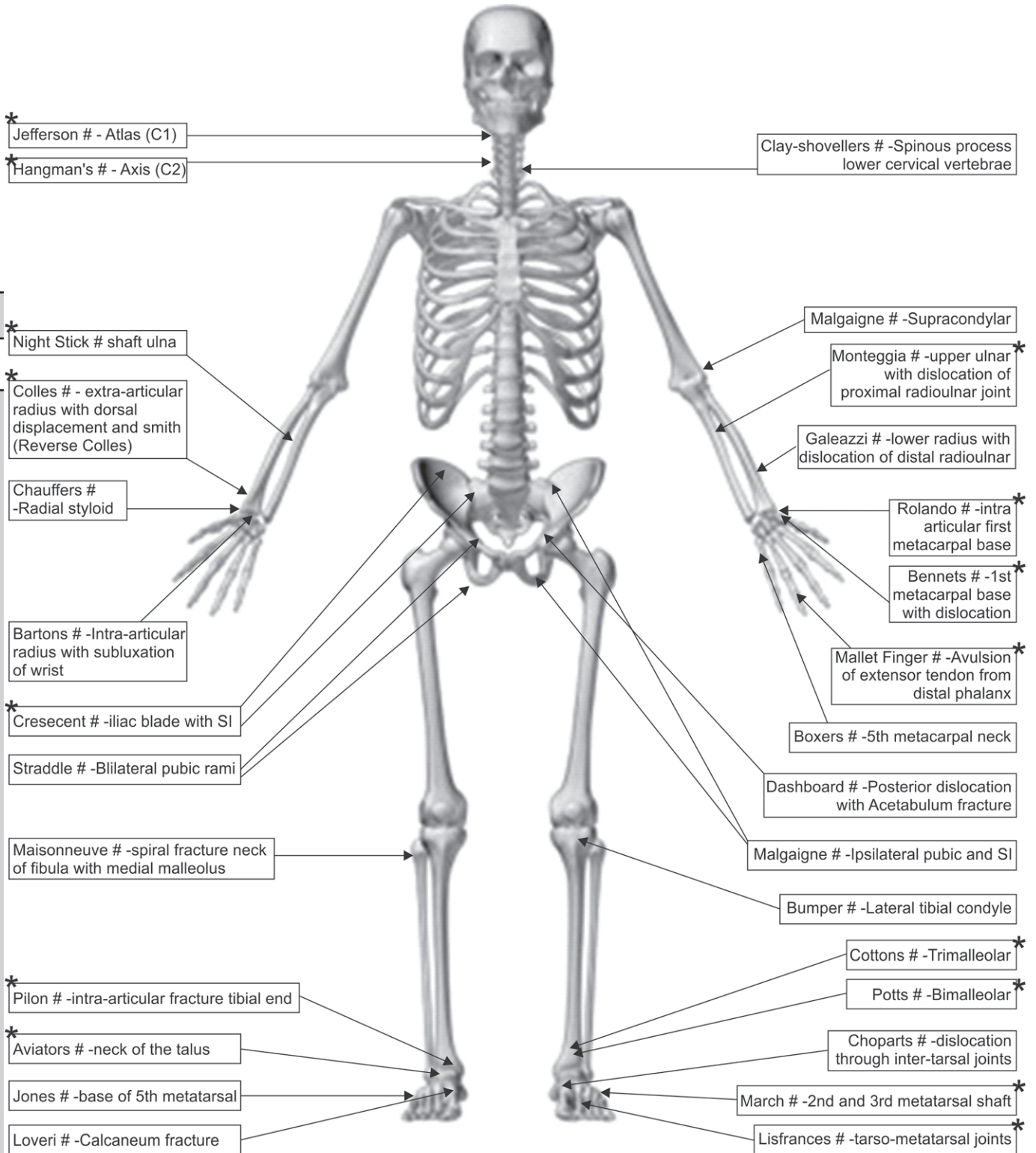
Calcaneum in over 20% of these patients suffer associated injury of spine (most common), pelvis or hip, base of skull and talus.

Angles in Orthopaedics

- Cobb's angle – Scoliosis
- Kite's angle – CTEV
- Meary's angle – Pes cavus
- Hilgenreiner's epiphyseal angle – Congenital coxa vara
- Baumann's angle – Supra condylar fracture

Chronic ankle instability can be satisfactorily treated by Watson-Jones operation. In which reconstruction of ankle ligaments is carried out.

Watson-Jones is also a lateral approach to the hip joint, which can be used for hip replacement (although rarely as more commonly used approaches are Moore's posterior and Hardinge's antero-lateral approach.) (AIIMS Nov 2008)



* Latest Questions

11. FRACTURE MANAGEMENT

Plaster Casts And Their Uses:

Name of the cast	Use
Minerva cast	Cervical spine disease
Risser's cast	Scoliosis
Turn-buckle cast	Scoliosis
Shoulder spica*	Shoulder immobilization
U-Slab/hanging cast	Fracture of the humerus
Hip spica	Fracture of the femur
Cylinder cast/tube cast	Fracture of the patella
Patellar tendon bearing cast(PTB cast)	Fracture of the tibia
Colle's cast	Fracture lower end radius
Glass holding cast	Fracture scaphoid ^Q

Gallows traction – Fracture shaft femur < 2 years of age.

(AIIMS May 2012, Nov 2011, Nov 2010)

Rush pin is used for fracture shaft femur not for traction

Superficial heat therapy infrared therapy

(AIIMS May 2007)

Closed reduction: Fracture hematoma is not exposed hence it does not interfere with fracture healing hence better prognosis for Extra articular fractures

Open reduction: Fracture hematoma is exposed it is usually carried out for articular fractures as exact reduction is essential to prevent arthritis or open reduction is carried out if closed reduction fails or if additional procedure like bone grafting at fracture site is required.

Internal fixation the fixation device is under the coverage of soft tissues plating or nailing.

External fixation the fixation device is external to skin-external fixator or ilizarov fixator.

Management of fracture

i. For long Bones

Intramedullary nailing eg K nail, interlocking nail, Rush nail, reconstruction nail –For lower limb diaphyseal fractures –Femur or Tibia

Plating for upper limb fractures –humerus or radius or ulna

Dynamic hip screw (DHS)-For Intertrochanteric fracture

ii. For short bones

Screws -articular fracture where headless screws(Herbert screw) are preferred eg scaphoid fracture

Cannulated cancellous screws- femur neck fracture

K-wire –fractures in children eg supracondylar fracture humerus (Closed reduced)or lateral condyle fracture(open reduced)

Tension band wiring –Patella or olecranon or medial malleolus

External fixator is used for open fracture

Ilizarov fixator is used for Shortening with discharging sinus ,nonunion and also for CTEV.

(AIIMS Nov 2009)

Surgical Excision Never done in growth plate injury e.g. Lateral condyle fracture

Iliac crest is the ideal and most common site for harvesting bone graft.

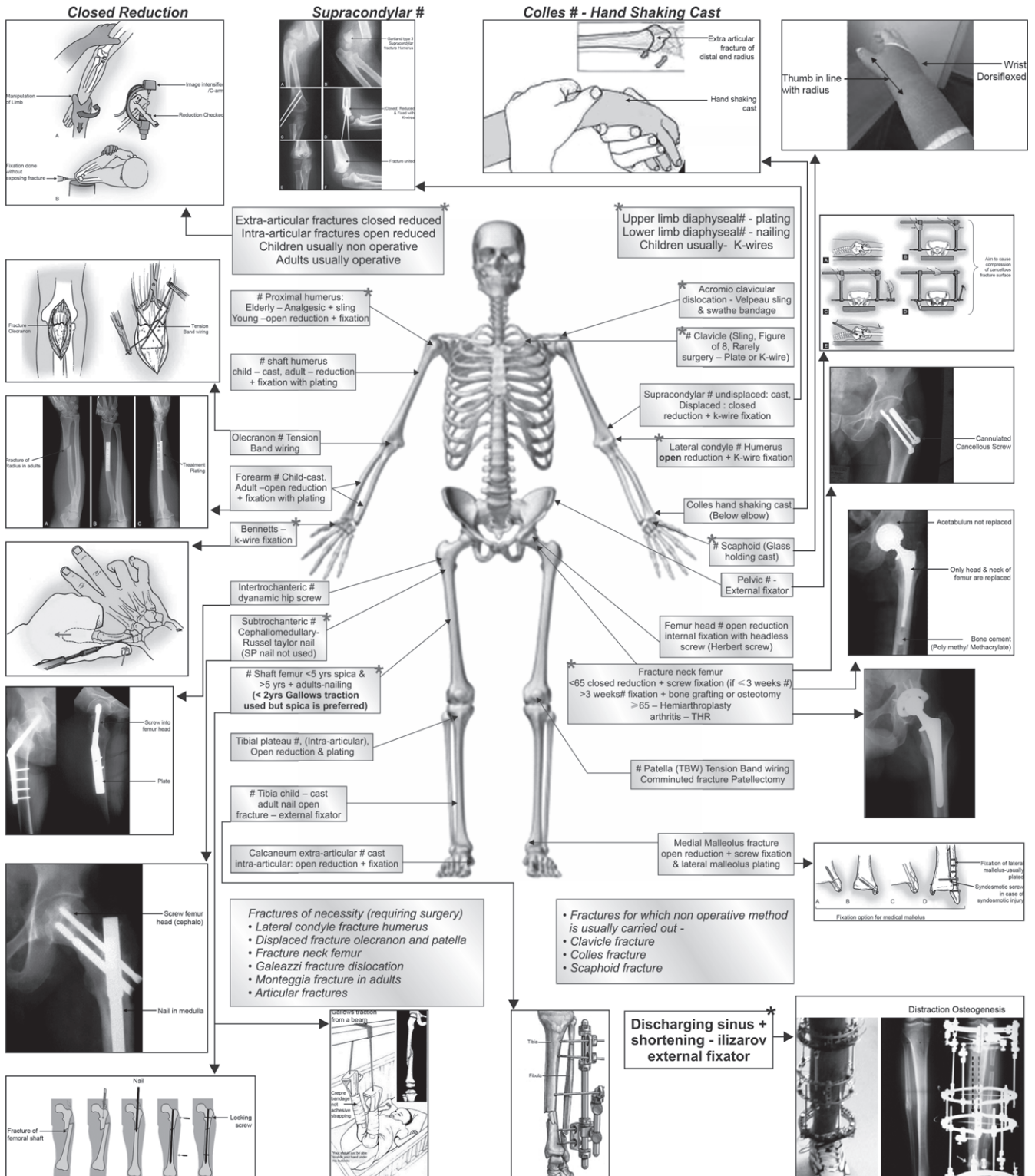
(AI 2008)

Iliac crest is the site for 1st order bone grafting

Reimplantation of amputated limb 1st repaired is Bone. (Skin is preserved 1st)

Common Splints/Braces And Their Uses:

Name	Use
• Crammer-wire splint	Emergency immobilization
• Thomas splint	Fracture femur Knee immobilization
• Böhler-Braun splint	Fracture femur, Knee and Tibia
• Aluminium splint	Immobilization of fingers
• Dennis Brown splint	CTEV
• Cock-up splint	Radial nerve palsy
• Knuckle bender splint	Ulnar nerve palsy/Median nerve palsy
• Toe-raising splint	Foot drop splint
• Volkmann's splint or Turn Buckle splint	Volkmann's ischemic contracture (VIC)
• Four- post collar	Neck immobilization
• Aeroplane splint	Brachial plexus injury
• SOMI brace (Sternal occipital mandibular immobilization brace)	Cervical spine injury
• ASHE (Anterior spinal hyper extension) brace	Dorso-lumbar spinal injury
• Taylor's brace	Dorso-lumbar immobilization
• Milwaukee brace	Scoliosis
• Boston brace	Scoliosis
• Lumbar corset	Backache
• Goldthwaite brace	Lumbar Spine (T.B.)
• Gallows' s traction	Fracture shaft of femur in children below 2 years (or <12kg body weight)
• Bryant's traction	Fracture shaft of femur in children below 2 years
• Russell's traction	Trochanteric fractures (described as skin traction)
• Buck's traction	Conventional skin traction
• Perkins traction	Fracture shaft femur in adults
• 90 degrees-90 degrees traction	Fracture shaft of femur in children
• Agnes-Hunt traction	Correction of hip deformity
• Well-leg traction	Correction of abduction deformity of hip
• Dunlop traction	Supracondylar fracture of humerus
• Smith's traction	Supracondylar fracture of humerus
• Head-halter traction	Cervical spine injuries
• Crutchfield traction	Cervical spine injuries
• Halo-pelvic traction	Scoliosis
• Minnerva cast, Halo device	Cervical spine
• Risser's cast, Milwaukee brace, Boston brace	Scoliosis (usually Idiopathic or Dorsal)
• Pelvic harness, Von Rosen splint Ilfeld or Craig splint	Developmental Dysplasia of Hip
• Broom stick (Petrie) cast	Legg Calve-Perthes Disease
• Figure of eight bandage	Clavicle
• Velpeau sling and swathe	Acromioclavicular dislocation > shoulder dislocation
• Gutter splint	Phalangeal and metacarpal fractures
• Thumb spica splint	Scaphoid fracture / Metacarpal fracture / Game keepers thumb
• Sugar tong	Humeral fracture
• Distal sugar tong/Reverse sugar tong	Distal forearm fracture
• Double sugar tone	Elbow fractures
• Buddy strapping	Phalangeal fracture



12. AMPUTATIONS

Mangled Extremity Severity Score (MESS): Predictor for Limb Survival after Crush Injury

"SIVA" - the destroyer will decide survival.

(AIIMS May 2011)

Type	Point
Shock Group	0-2
Ischemia Group	1-4
Velocity of Trauma	1-4
Age Group	0-1
Total Score:	11

MESS SCORE: Six or less consistent with a salvageable limb. Seven or greater amputation generally the eventual result.

A way to remember total of amputation stumps in upper and lower limbs is 15

Upper limbs 8 inch above elbow stump+7 inch below elbow stump=15 (in inches)

Lower limbs 9 inch above knee stump+5.5 below knee stump =14.5~15(in inches)

Myodesis is contraindicated, in severe ischemia because of the increased risk of wound breakdown. (AIPG 2009)

Amputation neuroma the physiotherapy modality to be preferred is TENS > interferential therapy > Ultrasound. TENS and interferential therapy works on the principle of inhibiting pain gate pathway hence are better for control of neurogenic pain. (AIIMS May 2012)

SACH (Solid Ankle Cushion Heel) foot does not allow ankle movements (required for squatting) and does not allow Subtalar movements (inversion and eversion movements required for walking on uneven grounds) Hence SACH foot is more suitable for western lifestyle and in Jaipur foot these movements are permitted hence it is more suitable for Indian scenario. (ALPG 2012)

13. SPORTS INJURY

- Predominant collagen in menisci/fibrocartilage – Type I collagen
- Predominant collagen in articular/hyaline cartilage – Type II collagen
- Physiological locking is internal rotation of Femur on Tibia.
- If knee is extended from flexed position tibial tuberosity moves towards lateral border of patella.
- The twisting force (rotation) in a weight bearing flexed knee is the commonest mode of meniscal (semilunar cartilage) injury. Medial meniscus > Lateral meniscus. (AIPG 2010)
- The commonest type of medial meniscal injury in a young adult is the bucket handle tear. This is vertical longitudinal tear that is complete.
- Smillie Classification – Meniscus Injury**

Meniscal Injury	Cruciate Injury/Collateral Ligament
1. Effusion	Hemarthrosis
2. Delayed Swelling	Immediate Swelling

- Meniscal cysts- Lateral > Medial

The etiology of Achilles insertional tendonitis is overuse

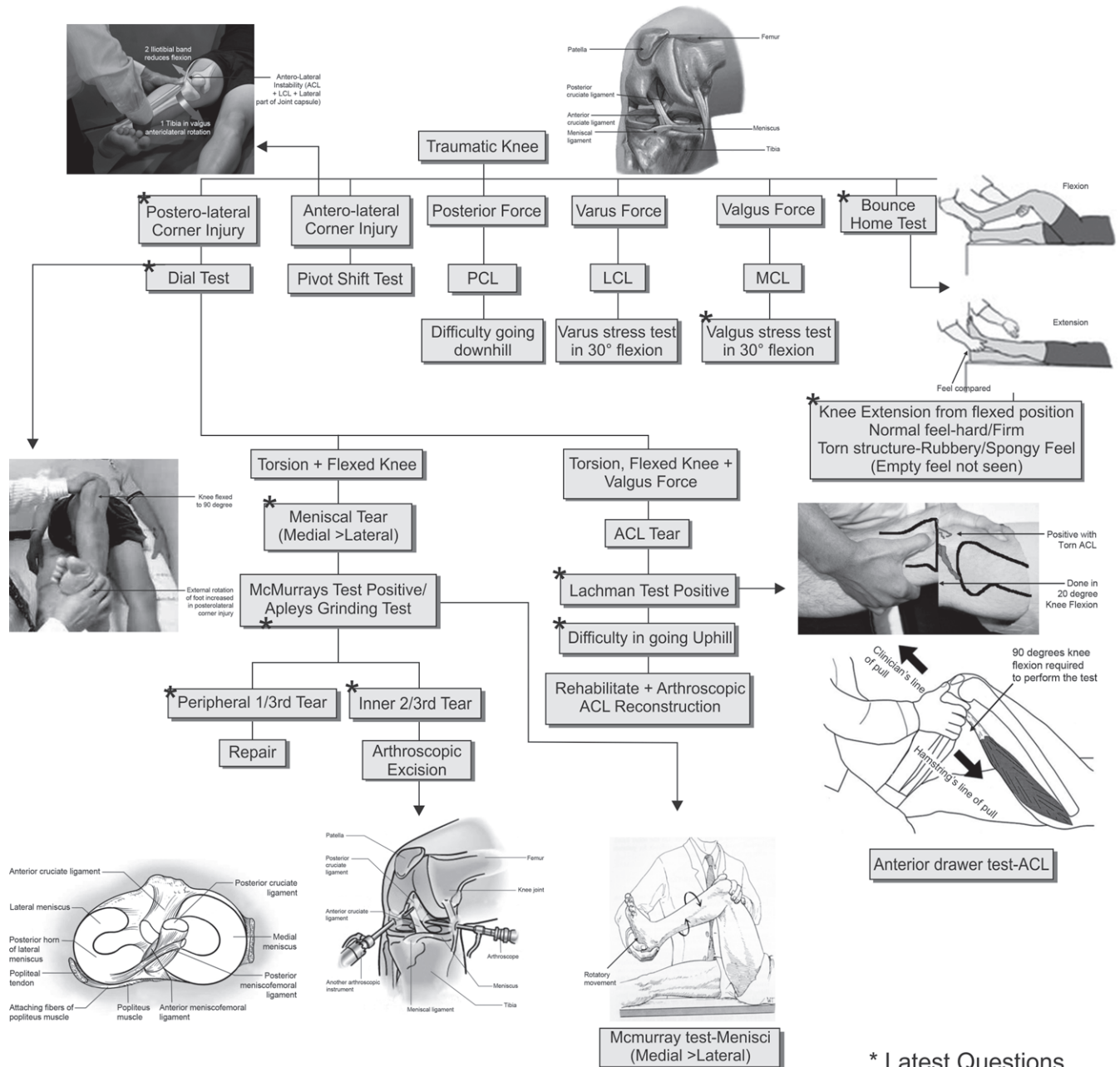
Non-insertional achilles tendonitis is more common and is seen in Athletes. It is seen 2–6 cms above the insertion of Tendoachilles. (AIIMS Nov 2008)

Tendon rupture-supraspinatus, biceps, and achilles tendons

Most TA tears occurs in left leg in the substance of TA, 2-6 cm above the calcaneal insertion (watershed zone). Test for TA rupture is Simmonds test or thompson test.

Game Keeper's/ Skier's - Thumb: Injury to the thumb metacarpophalangeal joint ulnar collateral ligament. Due to forced radial deviatory of thumb. Steners lesion is associated. (Trapped adductor pollicis between torn ulnar collateral ligament) Treatment is cast for 4 weeks and if steners lesion is present then surgery. (AIIMS Nov 2011)

Zone II (of flexor tendon injuries): Situated between the opening of the flexor sheath (the distal palmar crease) and insertion of flexor superficialis (flexor crease of proximal interphalangeal joint) is known as 'no man's land' or dangerous area of hand.



Anterolateral Corner: ACL + LCL + Lateral half of Joint Capsule.

Posterolateral Corner: LCL + Popliteus (Most important)

ACL: Anterior Cruciate Ligament

PCL: Posterior Cruciate Ligament

LCL: Lateral Collateral Ligament

MCL: Medial Collateral Ligament

* Latest Questions

14. NEUROMUSCULAR DISEASE

Disc Degeneration and Prolapse

The commonest site of disc prolapse is lumbar spine. In more than 90% of cases lumbar disc herniation are localized at L₄₋₅ (more common) and L₅ – S₁. The next commonest site of intervertebral disc prolapse is lower cervical spine (C₅₋₆).

- Lower nerve root is affected usually like in L₄₋₅ disc prolapse L₅ nerve root is affected.
- **L₅ nerve root supplies Extensor Hallucis longus, thigh abductors, ankle dorsiflexion and sensory supply to lateral aspect of leg dorsum of foot and great toe.** (It is most commonly involved in PIVD L₄₋₅) (AIIMS May 2012, Nov 2011)
- S₁ nerve root supplies Flexor hallucis longus, ankle plantar flexion, hip extension and sensation on sole of foot.

Investigations

- MRI is investigation of choice

Treatment

1. **Rest with Antiinflammatory Medications**
2. **Indications for surgery:**
 - Bladder and bowel involvement
 - Increasing Neurological deficit
 - Failure of conservative treatment (6 weeks)

“Red Flag” and “Yellow Flag” signs for Back ache

Red Flag (Requires further workup)	Yellow Flag
Red flags are possible indicators of serious spinal pathology: Thoracic pain Radicular impingement Fever and unexplained weight loss Bladder or bowel dysfunction History of carcinoma Ill health or presence of other medical illness Progressive neurological deficit Disturbed gait, saddle anaesthesia Age of onset <20 years or >55 years Prolonged steroid intake	Yellow flags are psychosocial factors shown to be indicative of long term chronicity and disability: A negative attitude that back pain is harmful or potentially severely disabling Fear avoidance behaviour and reduced activity levels An expectation that passive, rather than active, treatment will be beneficial A tendency to depression, low morale, and social withdrawal Social or financial problems

Chronic backache Prolonged bed rest is avoided

(AIPG 2009)

Spondylolysis is characterized by presence of bony defect at pars interarticularis, which can result in spondylolisthesis.

Spondylolisthesis is the slippage forward of one vertebrae upon another. L5 and S1 (most common)

Oblique or lateral view in spondylolysis dog with a collar in neck and spondylolisthesis beheaded Scottish Terrier sign

AP view is least useful except. In last stages on AP view inverted napolean hat sign is seen when complete slip occurs

(AIIMS Nov 2011)

- CT SCAN can diagnose early defects and slips
- MRI can diagnose cord compression
- CT. Scan and MRI are usually always done in spondylolisthesis

Frozen Shoulder or Adhesive Capsulitis

The cardinal feature is stubborn lack of active and passive movement in all directions. i.e. global restriction of movements in all planes. Often the first motion to be affected is internal rotation followed by abduction.

Painful Arc Syndrome

It is anterior shoulder pain in 60° - 120° of gleno humeral abduction. Most common cause is Chronic supraspinatus tendinitis.

Tennis Elbow/ Lateral Epicondylitis

- It is chronic tendonitis of common extensor origin (esp. extensor carpi radialis brevis) on lateral epicondyle.
- Cozen test is positive

Golfer's Elbow

Medial epicondylitis involving common flexor pronator origin.

De Quervain's Disease

The abductor pollicis longus and extensor pollicis brevis tendons may become inflamed beneath the retinacular pulley at the radial styloid with in the first extensor compartment. Finkelstein's test is positive. (AIIMS Nov 2011)

Dupuytren's Contracture

This is nodular hypertrophy and contracture of superficial palmar fascia (palmar aponeurosis). (AIIMS Nov 2011)

- Higher incidence in epileptics receiving phenytoin therapy, diabetics, alcoholic cirrhosis, AIDS, pulmonary tuberculosis.
- Ectopic deposits may occur in dorsum of PIP joint (Garrod's/knuckle pads), sole of feet (Ledderhose's disease) and fibrosis of corpus cavernosum (Peyronie's disease)
- Flexion contracture most commonly occur at MP joint. >PIP joint> DIP joint .
- Ring finger is most commonly involved> little finger> thumb and index finger
- PIP contractures soon become irreversible

Treatment

- Wait and watch
- Primary indication of surgery is fixed contracture of >30 degrees at MP joint or >15 degrees contracture at PIP joint. surgery is subtotal fasciectomy. Closure may be done by Z plasty.

Stenosing Flexor Tenosynovitis Trigger Finger

Due to stenosing tenosynovitis the flexor tendon may become trapped at the entrance to its fibrous digital sheath. The usual cause is thickening of fibrous tendon sheath or constriction of mouth of fibrous digital sheath. (mainly A1 pulley) at the level of metacarpophalangeal joint.

Mallet Finger/ Baseball Finger

It is avulsion of extensor tendon of the distal interphalangeal joint from its insertion at the base of distal phalanx. An acute mallet finger should be splinted and the DIP joint is kept in hyperextension for 6–8 weeks.

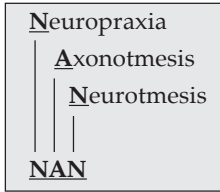
Bursitis	Site
Student's Elbow/miners elbow	Olecranon bursitis
Housemaid's knee	Prepatellar bursitis
Clergyman's knee	Infrapatellar bursitis
Weaver's bottom	Ischeal bursitis
Tailor's ankle	Lateral malleolus bursitis
Bunion	Medial side of great toe-1 st metatarsal head bursitis
Bunionette	5th toe of foot-5th metatarsal head bursitis

Athletic Pubalgia – The primary pathology in Athletic Pubalgia is: Abdominal muscle strain. (AI 2009)

Chondromalacia patellae Seen in adolescent females Patient has Anterior knee pain/Difficulty in climbing stairs/Movie Sign/"Theater sign" increased pain on getting up after prolonged sitting..

15. PERIPHERAL NERVE INJURY

SEDDONS order of nerve injury



Neuropraxia 100% recovery and only wait and watch can apply splint till it recovers

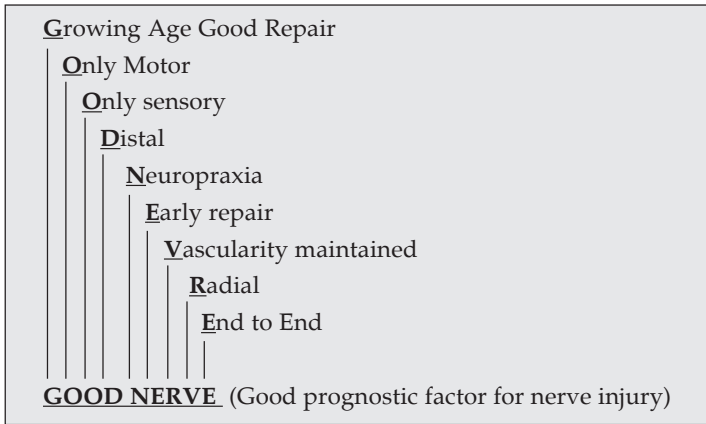
(AIIMS May 2012)

Sunderland classification – type 1 to 5, Type 1 –neuropraxia, type 2 3,4-axonotmesis, type 5 neurotmesis.

Tinel sign positive and progressive in axonotmesis and sunderland type 2 and 3

EMG is the best test for nerve recovery

Autonomous zones-Median nerve tip of index finger/ulnar tip of little finger



(AIIMS May 2008)

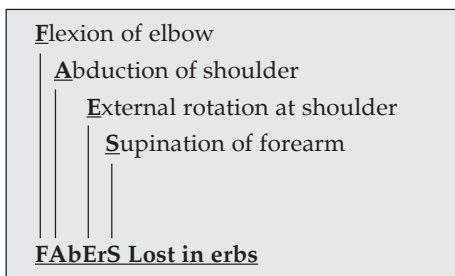
Rate of nerve regeneration – 1mm/day

Incidence of iatrogenic nerve injury is <3 percent

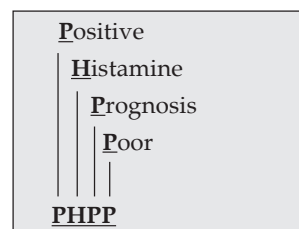
Nerve	Trauma	Effect
Axillary nerve	Dislocation of the shoulder (Anterior and Inferior)	Deltoid palsy
Radial nerve	Fracture shaft of the humerus (lower 1/3rd)	Wrist drop
Ulnar nerve	Fracture medial epicondyle humerus	Claw hand
Sciatic nerve	Posterior dislocation of the hip	Foot drop
Common peroneal nerve	Knee dislocation/Fracture of neck of the fibula	Foot drop
Posterior Interosseous Nerve	Monteggia fracture	Finger drop
Anterior interosseous nerve	Supra condylar fracture Humerus	Kiloh Nevin Sign
Median nerve	Supracondylar fracture of humerus	Pointing index

Brachial plexus most commonly –Erbs palsy(Policeman or waiters tip deformity)

Movements lost in ERBS palsy are



Preganglionic injury poor prognosis and in them Histamine test is positive



Median nerve palsy – Claw hand -pointing index(Flexors)/Pen test(Abductor pollicis Brevis) and ape thumb deformity
Opposition is lost with median nerve palsy at wrist
Knuckle bender splint is used

Anterior interosseous nerve palsy –KILOH NEVIN sign

Ulnar nerve palsy – Claw hand-CARD TEST(Palmar interossei)/IGAWA TEST(Dorsal interossei/BOOK TEST/FROMENT SIGN (Adductor pollicis)/Wartenbergs sign
Ulnar paradox (lower injuries more severe) – due to FDP spared in lower nerve injury.
Knuckle bender splint is used.

Radial nerve – Wrist drop

Posterior interossei nerve palsy – Thumb drop or finger drop

Cock up splint is used

Entrapment Syndrome	Nerve involved
Carpal tunnel syndrome	Median nerve (at wrist) (Most Common)
Pronator syndrome	Median nerve (proximally compressed beneath - ligament of struthers, bicipital aponeurosis or origins of pronator teres or flexor digitorum superficialis).
Cubital tunnel syndrome	Ulnar nerve (between two heads of flexor carpi ulnaris)
Guyon's canal syndrome	Ulnar nerve (at wrist)
Thoracic outlet syndrome	Lower trunk of brachial plexus, (C8 and T1) and subclavian vessels (between clavicle and first rib)
Piriformis syndrome	Sciatic nerve
Meralgia paraesthetica	Lateral cutaneous nerve of thigh
Cheralgia paraesthetica	superficial radial nerve
Tarsal tunnel syndrome	Posterior tibial nerve (behind and below medial malleolus)
Morton's metatarsalgia	Interdigital nerve compression (usually of 3rd, 4th toe)

Femoral nerve is usually not involved in Nerve Entrapment Syndrome

Carpal tunnel syndrome -compression of median nerve

Sensory symptoms can often be reproduced by percussing over the median nerve (Tinel's sign) or by holding the wrist fully flexed for a minute or two (Phalen's test) or tourniquet test or Dunkans direct compression over median nerve (most reliable clinical test for median nerve).

NCV investigation of choice

Tarsal tunnel syndrome – compression of posterior tibial nerve -Idiopathic > OA > RA

(AIPG 2009, 2007, AIIMS May 2009, AIPG 2007, AIIMS May 2010)

Meralgia paraesthetica-lateral cutaneous nerve of thigh

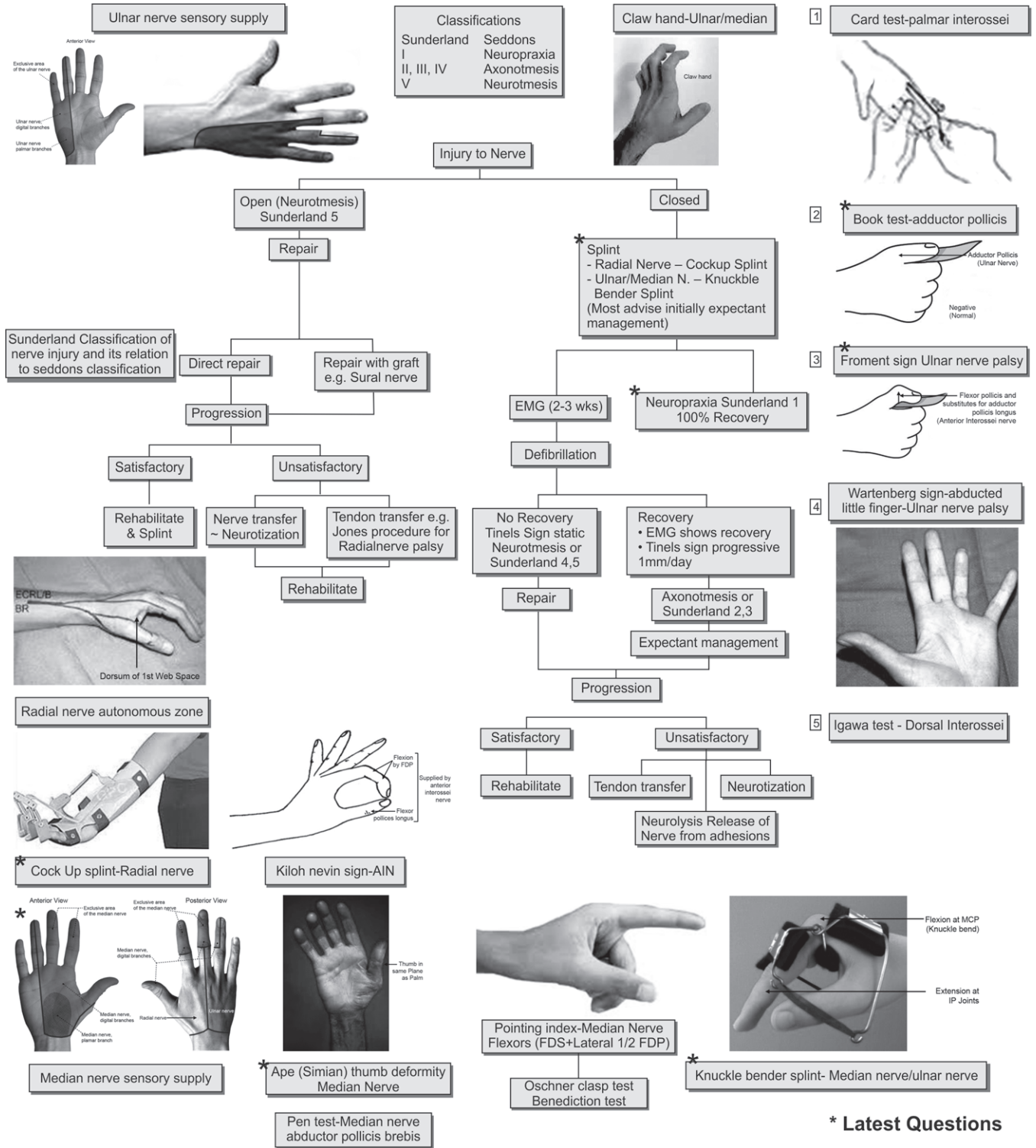
Fracture unite slower with muscular or neural disorders eg Polio

Contracture of iliotibial tract causes FABER(Flexion, abduction and External rotation) at hip and PERF (Posterior subluxation, External rotation and Flexion –TRIPLE Deformity) at knee.

Nerve Palsy	Presentation
1. Erb's palsy	Policeman tip deformity (Porter's tip deformity)
2. Nerve of bell (Long thoracic nerve) palsy	Winging of scapula
3. Median Nerve Palsy (Labours nerve)	Pointing index Bendiction test, Pen test (tests abductor pollicis brevis) Oschner clasp test/Opposition of thumb lost /Ape thumb deformity
4. Ulnar nerve palsy (Musician nerve)	Book test (froment sign), Card test (PAD) – Palmar Interossei Igawa's test (DAB) – Dorsal interossei
5. Radial nerve palsy	Wrist drop, (Finger drop and Thumb drop Specifically in posterior interosseous nerve (PIN) injury)
6. Common peroneal nerve palsy (Lateral popliteal nerve palsy) or sciatic nerve palsy	Foot drop(complete)

SIGNS AND TESTS

- Adson's test: for thoracic outlet syndrome
- Allen's test: for testing patency of radial and ulnar arteries
- Allis's test: for DDH
- Anvil test: for testing tenderness of the spine
- Ape thumb : for median nerve injury
- Apley's grinding test :for meniscus injury
- Apprehension test: for recurrent dislocation of the shoulder
- Barlow's test : for DDH
- Blue sclera : Osteogenesis imperfecta
- Bryant's test : for anterior dislocation of the shoulder
- Callways' test : for anterior dislocation of the shoulder
- Chovstek's sign : for tetany
- Claw hand : for ulnar nerve injury
- Coin test: for dorso lumbar tuberculosis of spine
- Cozen's test: for tennis elbow
- Drawer test : for ACL and PCL injuries
 - Anterior : for ACL injury
 - Posterior : for PCL injury
- Finkelstein's test : for de Quervain's tenosynovitis
- Foot drop : for common peroneal nerve injury
- Froment's sign : for ulnar nerve injury
- Gaenslen's test: for SI joint involvement
- Galeazzi sign : for DDH
- Gower's sign : for muscular dystrophy
- Hamilton ruler test: for anterior dislocation of the shoulder
- Lasegue's test: for disc prolapse
- Lachmann test: for ACL injury
- Ludloffs sign: for avulsion of lesser trochanter
- McMurray's test: for meniscus injury
- Nagffziger test: for disc prolapse
- Ober's test: for tight ilio- tibial band (e.g., in polio)
- O' Donoghue triad: triad of MCL, ACL and medial meniscus injuries occurring together
- Ortolani's test: for DDH
- Pivot shift test: for ACL injury
- Policeman tip : for Erb's palsy
- Runner's knee : Patellar tendonitis
- Sulcus sign: for inferior instability of the shoulder
- Thomas' test: for hip flexion deformity
- Trendelenburg's test: for unstable hip
- Tinel's sign: for detecting improving nerve injury
- Volkmann's sign : for ischaemic contracture of forearm muscles
- Wrist drop : for radial nerve injury



* Latest Questions

16. JOINT DISORDERS

Synovial Fluid

Synovial Fluid: It is an ultradialysate of blood plasma transudated from synovial capillaries to which hyaluronic acid protein complex (mucin) has been added by synovial B cells.

Normal aging Vs osteoarthritic pathology of articular cartilage

(AIIMS May 2010, AIPG 2009)

Cartilage property	Aging	Osteoarthritis
Total water content (Hydration)	Decreased	Increase (Decreased in advanced OA)
Proteolytic Enzymes:	Normal	Increased
Proteoglycan content	Decreased	Decreased

New bone formation is a feature of noninflammatory arthritis, e.g. Osteoarthritis

Complications of THR

- Infection
- Dislocation
- Mortality-MI> Cardiorespiratory Arrest>Pulmonary Embolism

(AIPG 2010)

Contraindications of Metal on Metal Bearing surfaces

- Patients with Renal Insufficiency (Chronic Renal Failure)
- Young females of child bearing age (Women who may potentially still have children)
- Metal hypersensitivity
- They can also cause chromosomal changes
- Their role in carcinogenesis is under evaluation

(AIPG 2010)

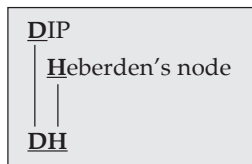
Contraindications of High Tibial Osteotomy (HTO) – (Usually done for osteoarthritis < 65 years of Age)

- Narrowing of lateral compartment cartilage space.
- Medial compartment bone loss of > 2 or 3mm
- Knee flexion of < 90 degrees
- Rheumatoid arthritis
- Lateral tibial subluxation of > 1cm
- Flexion contracture of > 15 degrees
- **More than 20 degrees correction needed**

(AIIMS May 2011)

Osteoarthritis

Osteoarthritis characteristically involves distal interphalangeal joint (Heberden's node), proximal interphalangeal joint (Bouchard's node) 1 carpometacarpal joint (base of thumb) of hand **with sparing of metacarpophalangeal joint and wrist joint.**



Due to decreased loading of painful extremity quadriceps weakness is common in patients of osteoarthritis of knee. Most importantly Vastus medialis is affected.

(AIIMS Nov 2011, AIPG 2007, AIIMS May 2007, AIPG 2011)

Classification system and stage wise management for OA knee

- Initial treatment is always conservative
- Clinical picture is more significant than radiology or xray changes
- If activities of daily living are affected surgery is advised
- Surgery for young is HTO (if not contraindicated) if contraindicated TKR is performed
- Surgery for elderly (>65 years) is TKR
- HTO-High Tibial Osteotomy
- TKR-Total Knee Replacement

Ahlback Grade	Definition	Treatment in young	Treatment in Elderly
Grade 1	Joint space narrowing	Conservative if fails HTO	Conservative if fails TKR
Grade 2	Joint space obliteration	Conservative if fails HTO	Conservative if fails TKR
Grade 3	Minor bone attrition (0-5 mm)	Conservative if fails surgery if bone loss <3 mm HTO otherwise TKR	Conservative if fails TKR
Grade 4	Moderate bone attrition (5-10 mm)	TKR	TKR
Grade 5	Severe bone attrition (>10 mm)	TKR	TKR
* >3 mm Bone Loss HTO is Contraindicated			
* TKR – Total Knee Replacement.			

Rheumatoid Arthritis

Classification Criteria for Rheumatoid Arthritis -2010		Score
Joint involvement	1 large joint (shoulder, elbow, hip, knee, ankle)	0
	2–10 large joints	1
	1–3 small joints (MCP, PIP, Thumb IP, MTP, wrists)	2
	4–10 small joints	3
	>10 joints (at least 1 small joint)	5
Serology	Negative RF and negative ACPA	0
	Low-positive RF or low-positive anti-CCP antibodies (3 times ULN)	2
	High-positive RF or high-positive anti-CCP antibodies (>3 times ULN)	3
Acute-phase reactants	Normal CRP and normal ESR	0
	Abnormal CRP or abnormal ESR	1
Duration of symptoms	<6 weeks	0
	>6 weeks	1

Total Score 10

Score ≥ 6 indicates – R.A

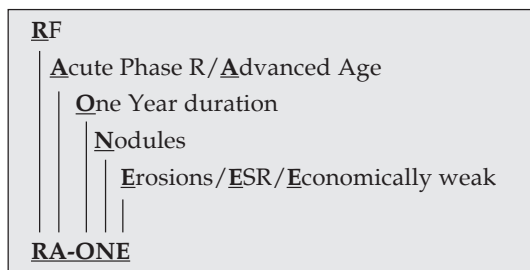
The 1987 Revised Criteria For Diagnosis Of RA

- Guidelines for classification 4 of 7 criterion are required to classify a patient as having RA Patients with 2 or more criteria are not excluded.
- Criteria (a - d must be present for at least 6 weeks and b- e must be observed by physician)
 - Morning stiffness, in and around joint lasting 1 hour before maximal improvement.
 - Arthritis of 3 or more joint areas, observed by a physician simultaneously, have soft tissue swelling or joint effusion, not just bony over growth. The 14 possible joint areas involved are right or left **proximal interphalangeal (PIP), metacarpophalangeal (MCP), wrist, elbow, knee, ankle and metatarsophalangeal joints (MTP)**. (AIIMS Nov 2008)
 - Arthritis of hand joints e.g. wrist, MP or PIP joints.
 - Symmetrical arthritis i.e. simultaneous involvement of same joint area on both sides of body.
 - Rheumatoid nodules*: Subcutaneous nodules over bony prominences, extensor surfaces or juxta articular region. (Pathognomic)
 - Serum rheumatoid factor .
 - Radiological changes*: Bony erosion or unequivocal bony decalcification, periarticular osteoporosis and narrowing of articular (joint) space.
 - Women are affected three times more often than men. The onset is most frequent during 4th and 5th decade of life, with 80% of all patients developing the disease between age of 35 and 50. The incidence of RA is more than 6 times greater in 60-64 years old women compared to 18-29 years old women.

Significance of Rheumatoid Factor (RF)

If present in high titre, to designate patients at risk for severe systemic disease.

Poor Prognostic Factors of RA



'Swan - neck deformity' i.e. hyperextension of PIP joints with compensatory flexion of the distal interphalangeal joints
 Boutonniere deformity i.e. flexion contracture of PIP joints and extension of DIP joints.

Pattern of Joint Involvement

	Osteoarthritis	Rheumatoid Arthritis	Psoriatic Arthritis
Involved	PIP, DIP and 1 st CMC (carpometacarpal) joints	PIP, MCP, wrist	DIP, PIP and any joint
Spared	MCP (metacarpophalangeal) and wrist	DIP joint	Sparing of any joint

Ankylosing Spondylitis (AS)/ Marie- Strumpell or Bechtrew's Disease

Diagnostic Criteria – Modified New York Criterion

- Essential criteria is definite radiographic sacroilitis
- Supporting criteria: one of these three
 - Inflammatory back pain
 - Limited chest expansion (<5 cm at 4thICS) not a reliable criterion in elderly because of pulmonary disorders
 - Limited lumbar spine motion in both sagittal and frontal plane (Schober test /Modified Schober test)
- Inflammatory Back pain 4/5 present
 - Pain for > 3 months
 - <40 years age
 - Insidious Onset
 - Improves with Exercise No improvement with rest
 - Pain at night

Never diagnose Ankylosing spondylitis without sacroilitis

(AIIMS May 2010)

	Ankylosing hyperostosis	Ankylosing spondylitis
Age	Elderly	Young
Sacroilitis	Absent	Always present
Chest expansion	Mild restriction	Marked but not reliable in elderly
Tenderness	Dorsolumbar	Sacroiliac
ESR	Normal to mild rise	High
Syndesmophytes	Present	Present

Hemophilic Arthropathy

Clotting factors

- <1% – Spontaneous Haemorrhage
- 1-5% – Haemorrhage on Mild Trauma
- >5% – Haemorrhage on Significant Trauma

Joint Bleeding

- Weight bearing joints are most commonly involved, with the frequency of involvement in decreasing order, **knee**> elbow> shoulder> ankle> wrist> hip
- **Ankle** most commonly involved in children
- Arthroscopy is relatively contraindicated.

Intramuscular Bleeding

- In lower limbs most common sites of bleeding is **iliopsoas**> **quadriceps**
- In upper limb the most common site of bleeding is deltoid
- Most hemophilic pseudotumors are caused by subperiosteal hemorrhage and the most common location is in thigh (50%). Next in frequency are abdomen, pelvis, and tibia.

Neuropathic Joint Disease/ Charcot's Joint

It is progressive destructive arthritis arising from loss of pain sensation and proprioception (position sense). Diabetes mellitus (most common) cause. Joints involved are **Midtarsal (most common)**> tarsometatarsal metatarsophalangeal and ankle joint.

Disease	Joint Involvement
Diabetes	Midtarsal (most common) > tarsometatarsal, metatarsophalangeal and ankle joint> knee and spine
Tabes dorsalis	Knee(most common) , hip, ankle and lumbar spine
Leprosy	Hand and foot joints
Syringomyelia	Shoulder (glenohumeral), elbow, wrist and cervical spine
Myelomeningocele	Ankle and foot
Congenital insensitivity to pain	Ankle and foot
Chronic Alcoholism	Foot
Amyloidosis	Peroneal Muscle atrophy (Charcot Marie tooth disease)

- The appearance suggest that movements would be agonizing and yet it is often painless.
- The paradox is diagnostic the amount of pain experienced is less than would be anticipated based on degree of joint involvement.
- Usual treatment is bracing or arthrodesis. total ankle Replacement is contraindicated.

Congenital Syphilis

Clutton's joint is painless, symmetrical, sterile effusion mostly involving knee in 8-16 years of age. Spontaneous remission is usual in several weeks.

- Non erosive arthritis : SLE
- Non deforming arthritis : Behcets

Disease	Area involved
• Septic	Knee
• Syphilitic arthritis*	Knee
• Gonococcal arthritis*	Knee

Table Contd...

Table Contd...

Disease	Area involved
• Gout*	MP joint of big toe
• Pseudogout*	Knee
• Rheumatoid arthritis	Metacarpophalangeal joint
• Ankylosing spondylitis*	Sacro iliac joint
• Diabetic charcot joint*	Foot joint (tarsals)
• Senile osteoporosis*	Vertebra
• Pagets disease*	Pelvic bones > Femur > Skull > Tibia
• Osteochondritis dessicans*	Knee
• Actinomycosis*	Mandible
• Haemophilic arthritis*	Knee
• Disc prolapse*	Between L4 and L5
• Acute Osteomyelitis*	Lower end of femur (Metaphysis)
• Brodies Abscess*	Upper end of Tibia

* **Difference between tumor calcinosis and Myositis ossifican**

Parameter	Myositis Ossificans	Tumor Calcinosis
Etiology	Traumatic	Idiopathic/Familial
Side/Site	Unilateral-Elbow	Bilateral-Knee
Symptom	Painful	Painless
Marker	ALP increased	Increased PO ₄

ALP is marker of heterotropic Ossification.

In questions if they ask unilateral calcification then answer is myositis and if they ask bilateral calcification then answer is usually tumor calcinosis.

PSEUDGOUT

Feature	Gout (Protein Aclohol intake)	Pseudgout (Hpothyroidism associated)
Synovial fluid Analysis	Uric acid crystal Needle or rod shaped crystal, Negatively birifringent crystals	Calcium pyrophosphate crystal, Rhomboid shaped crystal, Positive birifringent crystals
Associated with	ACTH, glucocorticoid withdrawal, hypouricemic therapy, Hyperuricaemia. "Alcohol and Protein intake"	Four 'H'S i.e. hyperparathyroidism, hemochromatosis, hypophosphatasia, hypomagnesemia are associated. Most common association is Hypothyroidism Chondrocalcinosis i.e. appearance of calcific material in articular cartilage and menisci is seen.
Clinicalpresentation	Intense pain	Moderate pain
Involved Joint	Smaller joints (most commoly metatarsophalangeal joint of big toe)	Larger joints most commonly, knee

Pathology

Tophi (=porous stone) are nodular deposits of monosodium urate monohydrate crystals, with an associated foreign body reaction. It is deposited in minute clumps in connective tissue eg.

- Bursae eg olecranon bursa/periarticular tissue
- Synovium and joints
- Ligaments
- Subcutaneous tissue
- Tophi may ulcerate through skin or destroy cartilage and periarticular bone
- Tendons
- Pinnae (cartilage) of ear
- Articular ends of bone
- Kidney

Arthritis with Soft-tissue nodules

1. Gout
2. Rheumatoid arthritis
3. Pigmented villonodular synovitis
4. Multicentric reticulohistiocytosis
5. Amyloidosis
6. Sarcoidosis

• Most common cause of anomaly of craniovertebral junctions is Atlanto-occipital fusion.

• Ankylosing spondylitis rarely involves craniovertebral junction and rheumatoid arthritis is a common cause of craniovertebral junction anomaly. (AIIMS Nov 2011)

Craniovertebral (CV) Junction Anomalies: (Base of Skull + C₁ + C₂)

Malformation of Occiput Bone:

- Basilar invagination
- Condylar hypoplasia

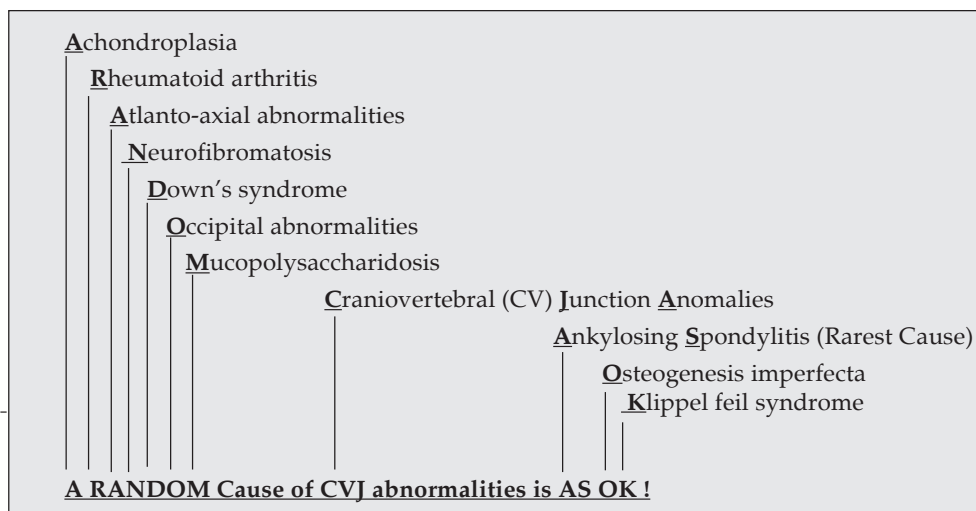
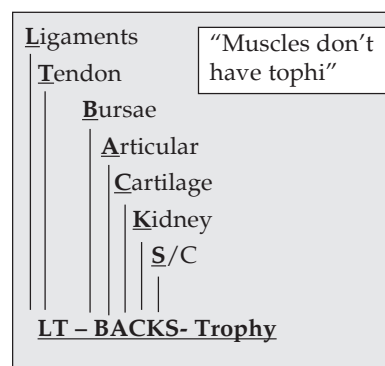
Malformation of Atlas (C₁)

Malformation of Axis (C₂)

OS odontoidum (dysgenesis of odontoid in which upper portion of odontoid is separated from base by a gap resembling ununited fracture)

Other causes are:

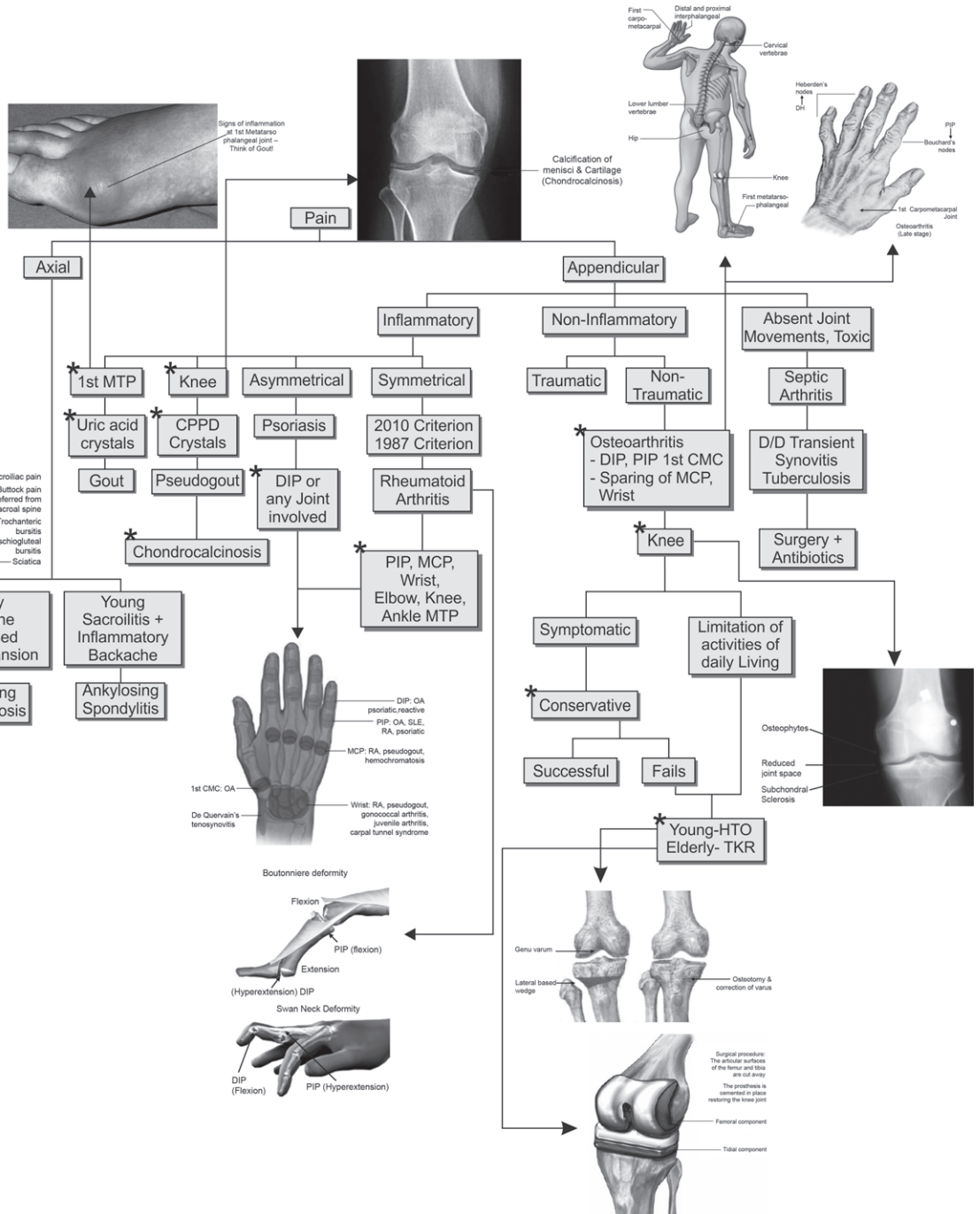
- Spondyloepiphyseal dysplasia
- Mucopolysaccharidosis storage disease
- Klippel - feil syndrome
- Osteogenesis imperfecta
- Ankylosing spondylitis (rarest cause)
- Achondroplasia
- Down's syndrome
- Neurofibromatosis
- Rheumatoid arthritis



Orthopedics Quick Review

1

* Latest Questions



17. METABOLIC DISORDERS OF BONE

There are four types of metabolic bone diseases.

- Osteopenic diseases:** These diseases are characterized by a generalized decrease in bone mass (i.e., loss of bone matrix), though whatever bone is there, is normally mineralized (e.g., osteoporosis).
- Osteosclerotic diseases:** There are diseases characterized by an increase in bone mass (e.g., fluorosis).
- Osteomalacic diseases:** These are diseases characterized by an increase in the ratio of the organic fraction to the mineralized fraction i.e., the available organic matter is undemineralized.
- Mixed diseases:** These are diseases that are a combination of osteopenia and osteomalacia (e.g., hyperparathyroidism).

NOTE:

- Rickets:** Lack of adequate mineralization of growing bones.
- Osteomalacia:** Lack of adequate mineralization of trabecular bone.
- Osteoporosis:** Proportionate loss of bone volume and mineral.
- Scurvy:** Defect in osteoid formation

Rickets

- A** – Abdomen protuberant
B – Bowing of bones
C – Costochondral Junction prominent - Rosary, Craniotables
D – Diaphragm pull - Harrisons groove (Lateral indentation of chest due to pull of diaphragm on ribs)/Double Malleolus
E – Enamel defect of teeth
F – Forward sternum - Pigeon chest
G – Growth plate - widening
H – Hypocalcemia causing Hyper PtH
I – Irritability
J – Joint deformities - Genu Valgum/Genu Varum
K – Kyphosis
L – Loosers Zones
M – Milestone delayed
R – Rickets

Pagets/primary hyperparathyroidism
 Osteomalacia bone
 Oncological
 Renal Rickets OD
 POOR Bone Increases ALP

	Calcium	Phosphate	ALP	PTH
Osteoporosis	NORMAL	NORMAL	NORMAL	NORMAL
Rickets/osteomalacia	N or low	Low	High	High
Primary Hyperparathyroidism	High	Low	High	High
Paget's disease	Normal	Normal	High	Normal

Hyperparathyroidism

	Primary (adenoma)	Secondary(usually due to osteomalacia)
Clinical Features	More	Less
Ca	High	Low or normal
PTH	Very high	High

NOTE: Von Recklinghausen's disease of bone is also called as osteitis fibrosa cystica (it should not be confused with Von Recklinghausen's disease (Neurofibromatosis type 1): In Osteitis fibrosa cystica there is fibrosa that is bony trabeculae are replaced by fibrous tissue and there is cystica that is cystic cavity in bone filled with blood and blood degradation products gives it Brown colour.

Radiological Features of Hyper parathyroidism

- Subperiosteal resorption of terminal tufts of phalanges, lateral end of clavicle and symphysis pubis.
- Loss of lamina dura (i.e. thin cortical bone of tooth socket surrounding teeth is seen as thin white line, is resorbed)
- Irregular, diffuse rarefaction of bones i.e. generalized osteopenia, thinning of cortices, and indistinct bony trabeculae.
- Brown tumor
- Salt pepper appearance of skull
- SCFE may be seen avascular necrosis
- **Rarely AVN**

Treatment is usually conservative and includes adequate hydration and decreased calcium intake. The indications of parathyroidectomy are marked hypercalcemia, recurrent renal calculi, progressive nephrocalcinosis and severe osteoporosis.

Milkman's/Increment fractures also known as looser's zones or osteoid zones are pseudofractures seen in osteomalacia most commonly femur neck.

Rugger Jersey Spine

- Rugger jersey spine is produced by alternating regions of dense bone and areas of central vertebral radiolucencies.
- Causes of Rugger Jersey Spine are:
 - i. Renal osteodystrophy due to hyperparathyroidism & osteosclerosis
 - ii. Osteopetrosis

SCURVY (VIT C: DEFICIENCY)

Scurvy: Deficiency of Vitamin C, causing defect in osteoid formation.

Pathology

- Vit C is necessary for hydroxylation of lysine and proline to hydroxylysine and hydroxyproline, two aminoacids crucial for proper cross linking of triple helix of collagen. So deficiency causes failure of collagen synthesis or primitive collagen formation, throughout the body, including in blood vessels, predisposing to haemorrhage.
- In bones zone of proliferation is affected primarily.
- Haemorrhage, is capillary in origin and occurs from gums, alimentary tract, subcutaneous tissue, and bone especially at the most actively growing metaphysis and beneath periosteum.
- Haemorrhage and fractures are common, but attempts of repair is disordered. The provisional zone of calcification is weak leading to epiphyseal separations.
- Dysfunctional osteoblast (flat resembling fibroblast) causes failure of osteoid formation resulting in generalized osteoporosis
- Chondroblast and mineralization is unaffected leading to persistence of calcified cartilage approaching metaphysis seen radiologically as opaque white line at junction of physis and metaphysis (Frankel's line)
- Osteoclasts are normal, thin and fragile trabeculae and cortices of bone are seen.
- Dentin formation in teeth is abnormal due to defective collagen

Clinical Feature

- It develops after 6 – 12 months of dietary deprivation thus not seen in neonates.
- Earliest features are restlessness, fretfulness, irritability, loss of appetite and failure to thrive
- Gums may be spongy and bleeding.
- Subperiosteal haemorrhage is a distinct sign occurring most commonly in distal femur and tibia and proximal humerus, causing excruciating tenderness pain near the large joints. The child lies still to minimize pain or minimally move the affected limb (Pseudoparalysis) - **(Frogs Like Posture is attained by child)**
- Haemorrhage in soft tissue, joint, kidney, gut and petechiae may be seen.
- Anemia and impaired wound healing is seen
- Beading of ribs at costochondral junction (Scorbutic Rosary).
- Systemic reaction (fever) is absent initially.

NOTE: In Rickets - Rosary is Round and non-tender, and in Scurvy it is Sharp and tender.

Radiological Feature

- Osteopenia (ground glass appearance) (1st sign) with thinning of cortex (Pencil thin cortex)
- Metaphysis may be deformed or fractured.
- Frankel's line (zone of provisional calcification increases in width and opacity) due to failure of resorption of calcified cartilage and stands Out compared to the severely osteopenic metaphysis.
- Scurvy line or scorbutic zone (Trummerfeld zone) is radiolucent transverse band adjacent to the dense provisional zone.
- Margins of the epiphysis appears relatively sclerotic, termed ringing of epiphyses or Wimberger's sign (Ring sign) - Important.
- Lateral metaphyseal spur (Pelkan spur) at ends of metaphysis is produced by outward projection of zone of provisional calcification and periosteal reaction.
- Corner or angle sign is peripheral metaphyseal cleft
- Subperiosteal haemorrhage

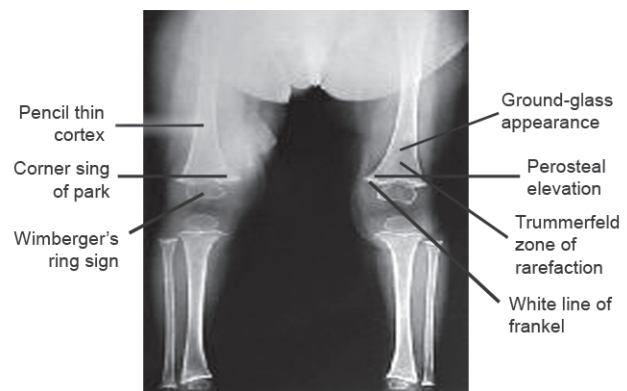
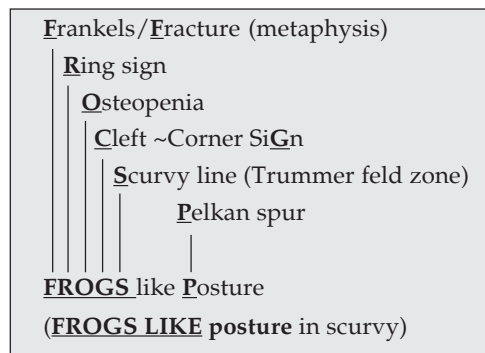


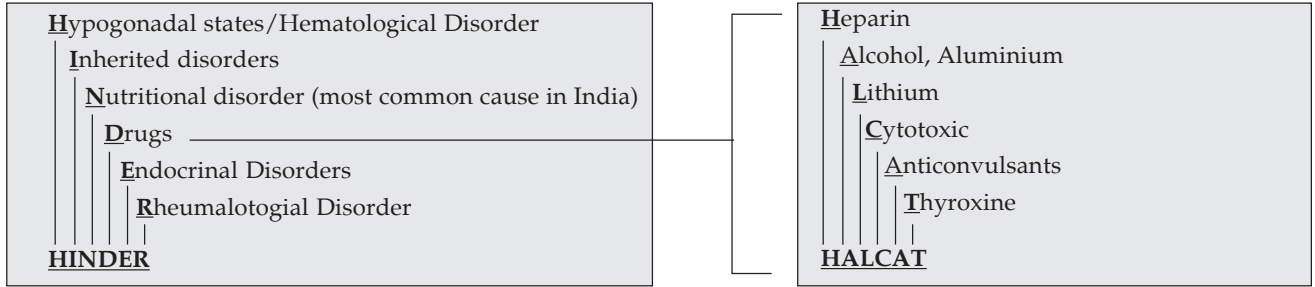
Fig. 1.5: Scurvy

OSTEOPOROSIS

- T score less than -2.5 is osteoporosis
- Osteoporosis with a fracture is severe osteoporosis

Upto age of 70, colle's fracture is m.c. fracture in osteoporotic patient; and after 70 years age vertebral fracture is mc. fracture. Strontium decreases bone resorption and increases bone formation. (AI 2008)

Factors that HINDER Bone Cause - Osteoporosis



Hematological: Leukemia, Lymphoma

1. Hypogonadal states e.g. Turner syndrome, Klinefelter syndrome.
2. Inherited e.g. Osteogenesis Imperfecta, Marfan syndrome.
3. Nutritional e.g. Malnutrition, Malabsorption
4. Drugs e.g. **A**nticonvulsants, **A**lcohol, **H**eparin, **L**ithium, **A**luminium, **C**ytotoxic drugs, Excessive **T**hyroxine.
5. Endocrinal disorders e.g. Hyperparathyroidism, Thyrotoxicosis, IDDM, Cushing Syndrome
6. Rheumatological Disorders:
 - Rheumatoid Arthritis,
 - Ankylosing Spondylitis

Treatment

1. Drug used in osteoporosis
Inhibit resorption: Bisphosphonates, **Denosumab**, calcitonin, estrogen, SERMS, gallium nitrate.
2. Stimulate formation: **Teriparatide** (PTH analogue), calcium, calcitriol, **fluorides**.
3. Both actions: Strontium Ranelate.

Fluorosis causes interosseous membrane ossification and increased density in skull vault.

- Dental changes
- Secondary Hyperparathyroidism

Infantile cortical hyperostosis - Caffey's Disease

Hypervitaminosis D and A can cause bone abnormalities.

Paget's Disease/Osteitis Deformans

It is characterized by excessive disorganized bone turnover, that encompasses excessive osteoclastic activity initially followed by disorganized excessive new bone formation. It is the osteoclast that appear larger and irregular whereas osteoblast are relatively normal.



Fig. 1.6: X-ray Pelvis: Paget's Disease

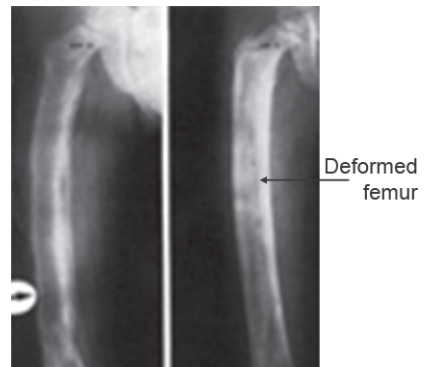


Fig. 1.7: X-ray Femur Paget's Disease

- The new bone formed is abnormal, very vascular and larger (deforms and fractures) than preexisting bone which leads to cortical widening and contributes to the deformity.
- The diagnostic histological feature of pagets disease is irregular areas of lamellar bone fitting together like a jigsaw with randomly distributed cement lines.
- It either occurs in one bone (monostotic Paget's disease) or multiple bones (polyostotic Paget's disease).

Etiology

- Genetic infection by paramyxovirus (measles and respiratory syncytial virus) has been linked.
- *Pathophysiology*: Increased bone resorption accompanied by accelerated bone formation is characteristic feature.
- Initial osteolytic phase involves prominent bone resorption and marked hypervascularization (Radiologically seen as advancing lytic wedge or **blade of grass lesion**) 2nd phase of active bone formation and resorption replaces normal lamellar bone with structurally weak woven bone that bend, bow and fracture easily.
- In 3rd sclerotic (burnt out) phase, bone resorption declines progressively and leads to hard, dense, less vascular pagetic or **mosaic bone**.

Clinical Features

- It is rare below 20, and most are over age 50 years
- Most people are asymptomatic
- The sites most commonly involved are - **pelvis**, tibia, followed by skull, spine, clavicle and femur
- **Affects men more commonly**
- **Pain is most common presenting symptom**
- Limb look bent and feels thick, and skin is unduly warm due to high vascularity hence the name osteitis deformans. Skull show frontal bossing and platybasia

Complications:

1. Pagetoid bone lacks the strength of normal bone. As a result it deforms and fractures more easily.
2. Cranial nerve ~ 2nd, 5th, 7th, 8th palsy is seen.
3. Nerve compression and spinal stenosis is seen.
4. **Deafness due to nerve compression > otosclerosis**
5. High output cardiac failure, Hypercalcemia (if immobilized)
6. Osteosarcoma (<1%) cases (poorest prognosis)
7. Steal syndrome i.e. blood is diverted from internal organs to skeleton system, may lead to cerebral ischemia and spinal claudication.
8. Osteoarthritis of Hip and Knee is common.

Diagnosis

- A. Serum calcium and phosphate levels are usually normal.
- B. Increased marker of bone formation (e.g. S. alkaline phosphatase and S. Osteocalcin) (**ALP levels are used for monitoring pagets**)
- C. Increased markers of bone resorption
Serum and urinary deoxypyridinoline, N telopeptide and C-telopeptide
Urinary hydroxy proline
 - Urinary deoxypyridinoline (24 hours assessment) is most valuable.

Radiological Features

- Long bone X-ray show deformity, enlargement or expansion of bone with cortical thickening coarsening of trabecular markings and lytic and sclerotic changes.
- Skull X-ray reveal "cotton wool" or osteoporosis circumscripta ,thickening of diploic area. **Increasing Hat Size!**
- Vertebral cortical thickening at superior and inferior end plates creates a picture frame vertebrae and diffuse sclerosis causing ivory vertebrae
- Pelvic radiograph show sclerotic ileopectinal line (Brim sign), fusion or disruption of sacroiliac joints, etc.

Treatment

Indications are

- A. To control symptoms of active disease as bone pain, fracture, neurological complications or pain from radiculopathy or arthropathy.
- B. To decrease local blood flow and minimize operative blood loss in patients undergoing surgery.
- C. To decrease hypercalciuria
- D. To decrease complications -When site of involvement involves weight bearing bones, skull, vertebral bodies and major joints.
- E. Biphosphonates are drug of choice and calcitonin is used to relieve pain.
- F. Surgery is done for pathological fracture, osteoarthritis, nerve entrapment and spine decompression.

ACHONDROPLASIA

- A primary defect of enchondral bone formation. Autosomal dominant (but 80% are spontaneous mutations). The effect of excessive growth hormone on the mature skeleton.
- They have normal intelligence, trident hand and starfish hand.

CLEIDOCRANIAL DYSOSTOSIS

- It is an autosomal dominant (AD) disorder caused by CBFA1 gene on chromosome 6 p 21 responsible for osteoblast specific transcription factor and regulation of osteoblastic differentiation. In this disorder bones formed by intramembranous ossification are abnormal (primarily clavicles, cranium and pelvis). —Absent clavicle

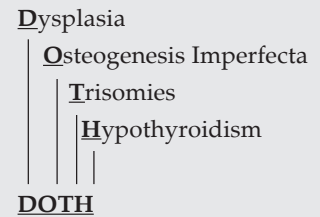
Morquio's syndrome has Most severe skeletal abnormalities amongst Mucopolysaccharidoses

Osteogenesis Imperfecta/Lobstein Vrolik's/ Brittle Bone Disease

- Osteogenesis Imperfecta/Lobstein Vrolik's/Brittle Bone Disease.
- It is a genetic disorder of connective tissue determined by quantitative and/or qualitative defect in type I collagen formation. So there is alteration in the structural integrity, or a reduction in the total amount of type I collagen, one of the major components of fibrillar connective tissue in skin, ligaments, bones, sclera, and teeth.
- It is inherited from a parent in autosomal dominant (AD) fashion, may occur as spontaneous mutation, or, rarely as autosomal recessive (AR) trait.
- The defining clinical features are Osteopenia causing repeated propensity to fracture, generally after minor trauma and often without much pain or swelling.
- **Any fracture pattern may be seen, and no particular fracture pattern is specifically diagnostic. Fractures heal at a normal rate.**
- Fracture callus is typically wispy but on rare occasions it may be very large and hyperplastic, resembling osteogenic sarcoma on radiographs.
- According to the severity of disease fractures may occur in utero, at birth, or after birth prior to or after walking age.
- Recurrent fractures are discovered during infancy and throughout childhood because of combination of disuse osteopenia, progressive long bone deformity and joint stiffness from immobilization
- **Lower limb fractures are more common than upper limb. Femur is commonest bone fractured followed by tibia.**
- Frequency of fractures decline sharply after adolescence or puberty, although it may rise again in postmenopausal (climacteric) women
- New bone is pliable for long time due to defective osteoid formation, thus leading to malunion and severe deformities. eg acetabular protrusion (otter pelvis), helmet head, kyphoscoliosis, bowing, etc.
- Hyper laxity of ligaments, with resultant hypermobility of joint is common.
- **Rarely recurrent dislocation of patella, radial head and hip joint dislocation and DDH can occur.**

Radiological Feature

- Popcorn calcification and whorls of radiodensities.
- Skull has a mushroom appearance with a very thin calvarium
- **Wormian** bones, are detached portions of primary ossification centers of adjacent membrane bones. These are seen in skull x-ray. To be significant, it should be more than **10 in number**, measure at least **6 mm x 4mm**, and be arranged in **general mosaic pattern**.
- Wormian bones are present in osteogenesis imperfecta, other bone dysplasias such as cleidocranial dysplasia, congenital hypothyroidism, and some trisomies.



Ocular Involvement

- “Blue or grey sclerae”, is because of **uveal pigment showing through thin collagen layer**.
- **Saturn's ring is white sclera** immediately surrounding the cornea
- Arcus juvenilis or embryotoxon, is opacity in periphery of cornea.
- Hyperopia and retinal detachment may occur

Auditory Involvement

Deafness, usually onsetting in adolescence or adulthood may be either of the conductive type due to otosclerosis or of nerve type, caused by pressure on the auditory nerve as it emerges from the skull.

Dentinogenes Imperfecta/Crumbling of Teeth: “Dentine affected”

- The enamel is essentially normal, as it is of ectodermal origin, not mesenchymal
- Both deciduous and permanent teeth are involved. They break easily and are prone to carries. Yellowish brown or bluish gray discolouration of teeth is common.
- The lower incisors, which erupt first are more severely affected.

Skin and Muscle Involvement

- Skin is thin and translucent. Subcutaneous haemorrhages may occur.
- Muscles are hypotonic mostly due to multiple fractures and deformities. Hernias may occur

Metabolic Features

- Excessive sweating, heat intolerance are due to hypermetabolic state
- Susceptible to malignant hyperthermia during general anesthesia.

Diagnosis of Osteogenesis Imperfecta

- A molecular defect in type I procollagen can be detected in 2/3 of patients by incubating skin fibroblasts with radioactive amino acids and then analyzing the pro α chains by polyacrylamide gel electrophoresis.
- Mutations are defined by sequencing of genomic DNA. Exact mutation is identified by using 100 polymerase chain reactions (PCR) to analyse 10,000 bases in each of two collagen genes.
- After a mutation in type I pro collagen gene is identified, a simple PCR test can be used to screen family members at risk or for prenatal diagnosis. Chorionic villi biopsy at 8-12 weeks demonstrates synthesis of abnormal pro α chains
- Prenatal USG shows multiple fractures.
- Sillence classification: Type I to IV

AD Type I and IV / AR Type II & III

- I. Autosomal dominant Bone fragility, Blue sclera and fracture are seen after birth (Most common)
- II. Autosomal recessive is Lethal in perinatal periods and lacks blue sclera
- III. AR (Dentinogenesis imperfecta), Crumpled femur, fracture at birth
- IV. Autosomal dominant - Normal sclera/ Normal hearing

Treatment

- Bisphosphonates (Decreases Osteoclastic bone resorption): One of the few indications of Bisphosphonates is growing age.
- Ideal treatment replace COL1A1 or COL1A2 gene.

OSTEOPETROSIS

Marble bone disease or Albers schonberg disease

Etiopathology

- It is a diaphyseal dysplasia characterized by failure of bone resorption due to functional deficiency of osteoclast. The bone contains increased number of osteoclasts but these don't resorb bone as evidenced by absence of ruffled borders and clear zones and are unable to respond to PTH. Due to functional deficiency of osteoclasts, calcified chondroid (cartilage) and primitive woven bone persists down into metaphysis and diaphysis leading to osteosclerosis and increased brittleness of bones (marble bone disease)
- Inheritance depends on form of disease: Malignant osteopetrosis (congenital form) is autosomal recessive (AR, 11q 13) and late onset Osteopetrosis tarda (adolescence /adult form) is AD (1P 21)
- Intermediate form is AR

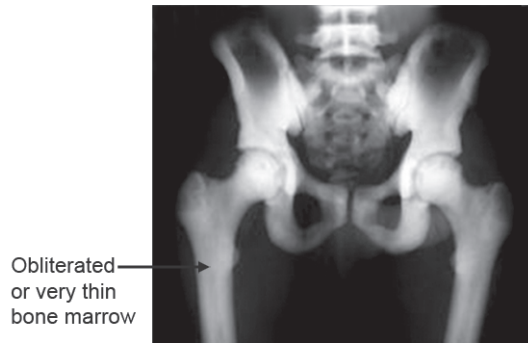


Fig. 1.8: X-ray of osteopetrotic bone

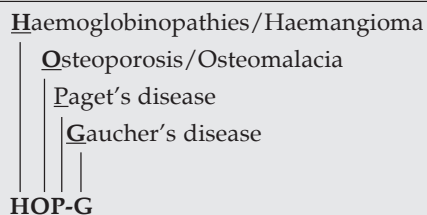
Clinical Presentation

- Autosomal dominant ,benign or tarda osteopetrosis is often diagnosed in adult asymptomatic patients. It may present with mild anemia, pathological fractures premature osteoarthritis, and rarely osteomyelitis of mandible.
- Autosomal recessive malignant (congenital) osteopetrosis clinically presents at birth or in early infancy because of Obliteration of marrow cavity by bony overgrowth resulting in inability of bone marrow to participate in hematopoiesis. Pancytopenia develops resulting in abnormal bleeding, easy bruising, progressive anemia, and failure to thrive
- Severe infections esp. Mandible
- Extramedullary hematopoiesis causing hepatosplenomegaly.
- Cranial nerve palsies (Bony Overgrowth of Cranial Foramen) 2nd ,7th and 8th - blindness and deafness
- Fragile brittle bones
- Pathological fractures
- Radiological hallmark is increased radiopacity of bones. There is no distinction between cortical and cancellous bone, because intramedullary canal is filled with bone
- Endobones (os in os or bone with in bone appearance) and rugger jersey spine
- Treatment is bone marrow transplant

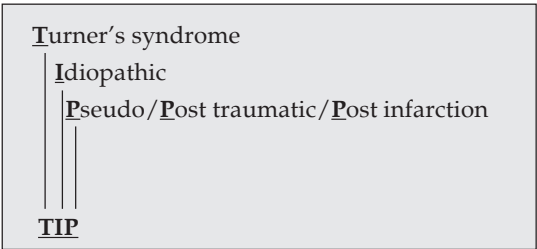
Muscle most Commonly affected by congenital absence is Pectoralis major

METABOLIC BONE DISEASES

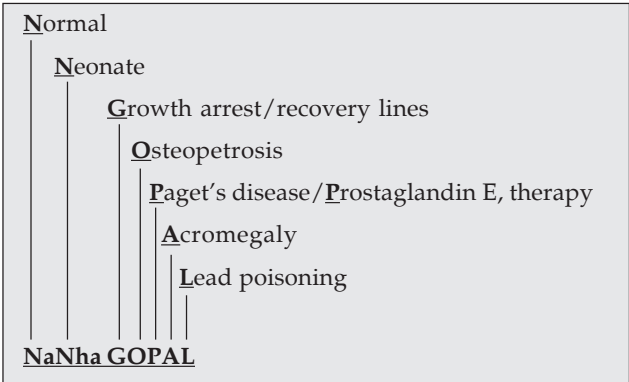
Coarse Trabecular Pattern-HOP-G



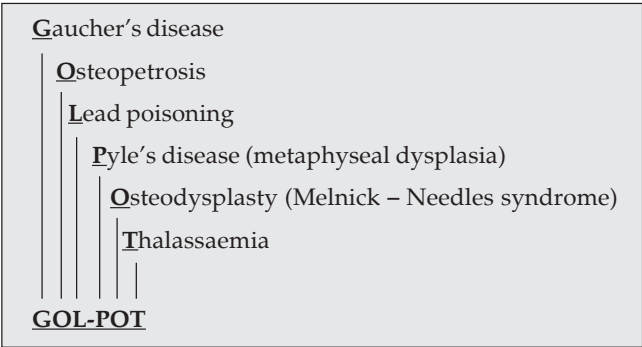
Short Metacarpal (s) or Metatarsal (s)-TIP

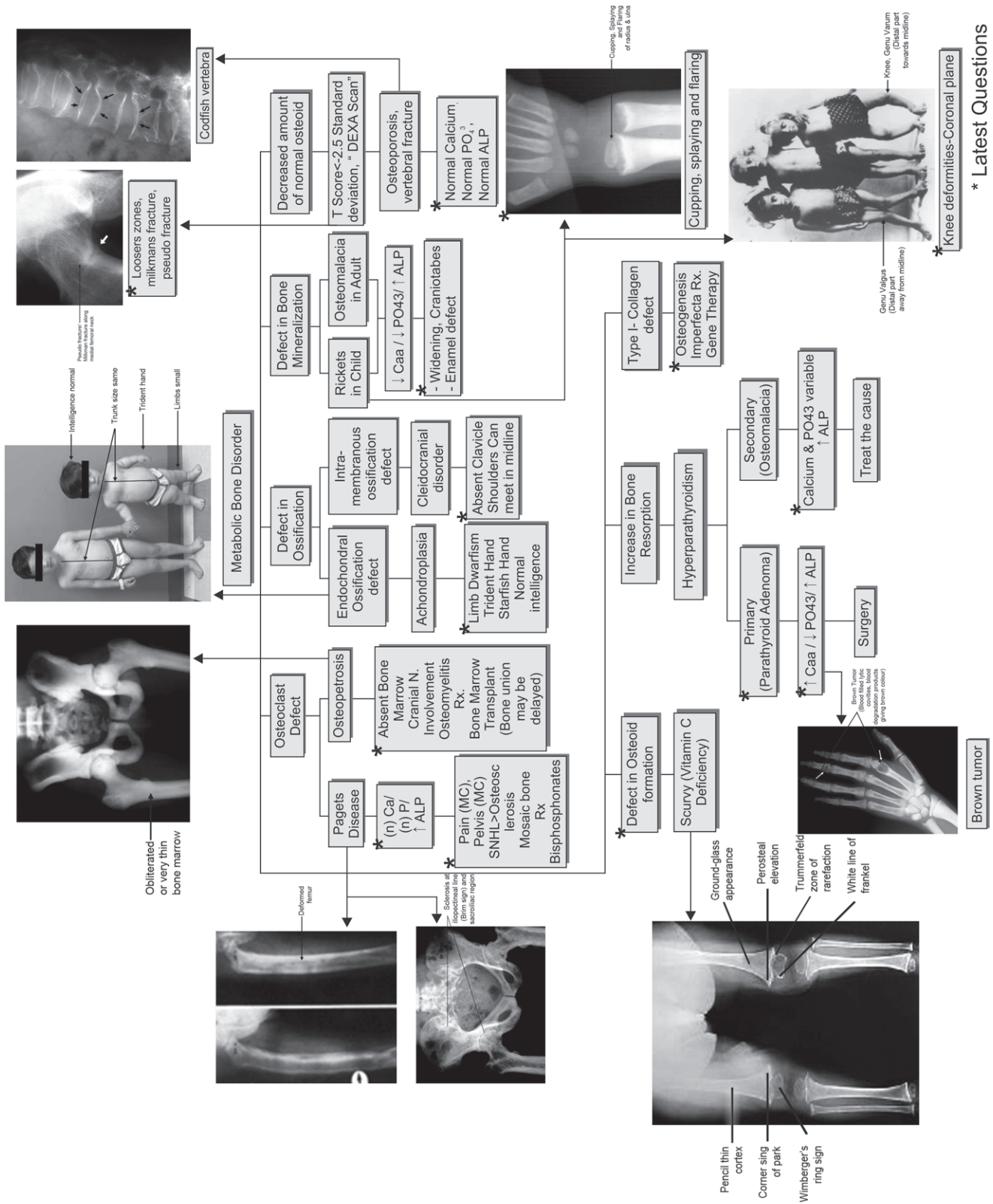


'Bone within a Bone' Appearance NnNha GOPAL



Erlenmeyer Flask Deformity GOL POT





* Latest Questions

18. PEDIATRIC ORTHOPAEDICS

Coxa Vara

It is reduced angle between neck and shaft of femur due to some growth anomaly at upper femoral epiphysis (infantile type) or secondary to various other pathologies (acquired).

The normal femoral neck shaft angle is 160° at birth, decreasing to 135 degrees in adult life. An angle of $<120^\circ$ is called coxa vara.

Classification (Causes) of Coxa Vara

Congenital Coxa Vara

- Congenital femoral deficiency with coxa vara
- Developmental coxa vara

Acquired Coxa Vara

- SCFE (slipped capital femoral epiphysis)
- Sequelae of avascular necrosis of femoral epiphysis
- Legg-Calve Perthe's disease
- Femoral neck fracture, Intertrochanteric fracture.
- Rickets

Clinical

- Painless limp in a child who has just started walking
- Shortening-Limitation of abduction and internal rotation

Radiological

- Reduced neck shaft angle (varus)
- Vertical epiphysis plate
- Separate triangle of bone in infero-medial part of metaphysis called as **Fair Bank's triangle**
- Hilgenreiners epiphyseal angle; angle between horizontal line joining center (triradiate cartilage) of each hip (Hilgenreiner's line) and line parallel to physis; the normal angle is about 30 degrees.

Treatment (based on HE Angle) – Hilgenreiners epiphyseal angle.

$>40^\circ$ but $<60^\circ$ Observation

$>60^\circ$ or if shortening is progressive. Subtrochanteric valgus osteotomy

Legg Calve Perthe's Disease/Osteochondritis Deformans Juvenilis/Coxa Plana

It can be defined as osteonecrosis of the proximal femoral epiphysis in a growing child caused by poorly understood (non genetic) factors.

Etiology

- The precipitating cause is unknown but the cardinal step in the pathogenesis is ischemia of femoral head. Between 4 and 8 years of age femoral head depends for its blood supply and venous drainage almost entirely on the lateral epiphyseal vessels whose situation in retinacula makes them susceptible to stretching and to pressure from an effusion.

Pathogenesis

Clinical Presentation

- 4 to 8 years of age
- Male > Female
- Bilateral in 10% cases
- Most frequent symptom is limp that is exacerbated by activity and alleviated with rest.

- 2nd most frequent complaint is pain.
- The classical child is small often thin, extremely active, constantly running and jumping, and limping after strenuous physical activities.
- Abductor limp, a combination of antalgic and Trendelenburg gait and positive Trendelenburg test on the involved side.
- During the very early phase, joint is irritable so extremes of all movements are diminished and painful.
- Later on most movements are full, but abduction (especially in flexion) is nearly always limited and usually internal rotation also. **When the hip is flexed it may go into obligatory external rotation (catterall's sign) and knee points towards axilla.** (Normally goes towards mid-clavicular region)



Fig. 1.9: Perthes disease

Course of Disease

Most consistent factor affecting course is patient's age at onset of disease. Younger age better prognosis. Outcome is also affected by duration from onset to complete resolution; the shorter the duration the better the final results.

Head at Risk sign in perthes are: (These indicate poor development of femur head from femur epiphysis)

- Lateral subluxation of the femoral head
- Speckled calcification lateral to the capital epiphysis
- Gage sign-a radiolucent 'V' shaped defect in the lateral epiphysis and adjacent metaphysis.
- Sagging Rope Sign – metaphyseal sclerotic band

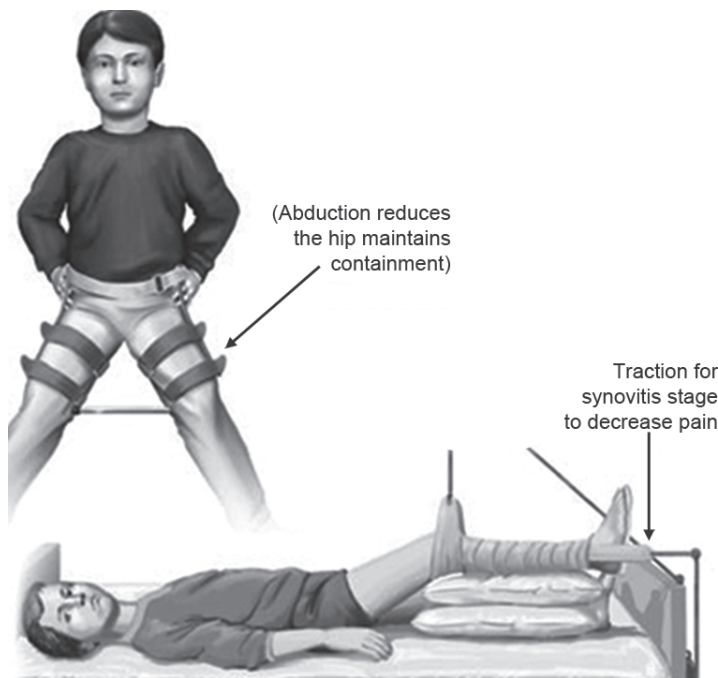


Fig. 1.10: Treatment of Perthes

Investigation

MRI is the investigation of choice.

At first x ray may seem normal, though subtle changes such as widening of joint space and slight asymmetry of ossification centres are usually present (isotope scan may show void in anterolateral part of femoral head). The classical feature of increased density (sclerosis) of the ossification nucleus occurs later and may be accompanied by fragmentation or **crescentic subarticular fracture** (best seen in lateral view). The head tends to flatten and enlarge (coxa plana)

Management

The main aim of treatment is containment of femoral head in acetabulum. Non surgical containment is achieved by orthotic braces. All braces abduct the affected hip, most allow for hip flexion, and some control rotation of the limb. Broomstick or petrie cast issued.

Surgical containment is through (1) Femoral varus derotation osteotomy, (2) Chiari osteotomy and chielectomy (surgically removing protruding fragments of femoral head usually antero lateral).

Slipped Capital Femoral Epiphysis

During a period of rapid growth, **due** to weakening of upper femoral physis and shearing stress from excessive body weight, there is upward and anterior movement of femoral neck on the capital epiphysis. So **the epiphysis is located primarily posteriorly and medially relative to the femoral neck.**

Aetiology

- The cause is unknown in vast majority of patients.
- Many of the patients are either **fat and sexually immature** or excessively **thin and tall**.
- Endocrinopathies such as **Hypothyroidism** (most common)
Growth hormone excess caused by growth hormone deficiency conditions treated by growth hormone administration.
- Chronic renal failure (Hyperparathyroidism)
- Primary **hyperparathyroidism**
- Pan hypopituitarism associated with intracranial tumors
- Craniopharyngioma
- Turner's syndrome
- Rubinstein Taybi syndrome
- Many a times it presents in **growth spurt**.

- MEN 2 B
- Klinefelters syndrome
- Prior pelvic irradiation

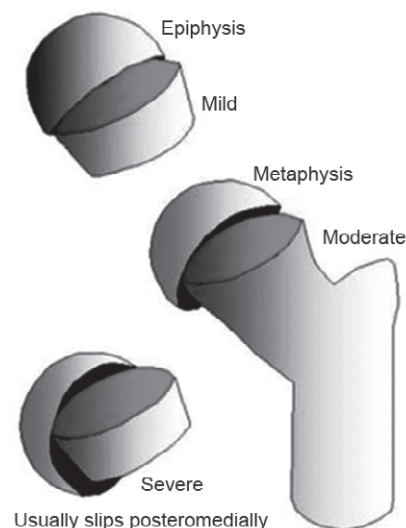


Fig. 1.11: Slipped Capital femoral Epiphysis

Pathogenesis and Pathology

Slip occurs through **hypertrophic zone of growth plate** classically in obese hypogonadal male (adiposo genital syndrome)

Normally, pituitary growth hormone activity stimulates rapid growth and increases physeal hypertrophy during puberty (adolescent growth spurt). This is balanced by increasing gonadal hormone activity, which promotes physeal maturation and epiphyseal fusion. So growth hormone excess or hypogonadism is provocative of SCFE.

Physeal disruption causes premature fusion of epiphysis-usually within 2 years of the onset of symptoms.

Clinical Picture

- An adolescent child (boys 13-15 and girls 11-13) typically overweight or very thin and tall presents with pain some times and Antalgic limp, with the affected side held in a position of increased external rotation, (turning out of leg). Restriction of internal rotation, abduction and flexion.
- **A classical sign is tendency of thigh to rotate in to progressively more external rotation, as the affected hip is flexed called as Axis deviation.** (Similar to Perthes)
- Slipping usually occurs as a series of minor events rather than a sudden, acute episode. Patient with unstable acute or acute on chronic SCFE characteristically present with sudden onset of severe, fracture like pain usually as a result of a relatively **minor fall or twisting injury**.
- Chondrolysis complicating SCFE presents with more continuous pain, hip held in an external rotated position at rest, with flexion contracture and **global restriction of hip motion**. The patient usually complains of pain throughout the arc of motion rather than just at its extremities.
- 20% cases will have evidence of contralateral slip. 60% of patients will have bilateral involvement when associated with endocrinopathies.
- Chondrolysis (**Destruction of Cartilage**) and avascular necrosis are possible complications

Investigation

A line drawn tangential to superior femoral neck (**klein's line**) on AP view will intersect a portion of the lateral capital epiphysis normally. With typical posterior displacement of capital epiphysis this line will intersect a smaller portion of the epiphysis or not at all **trethowans sign**.

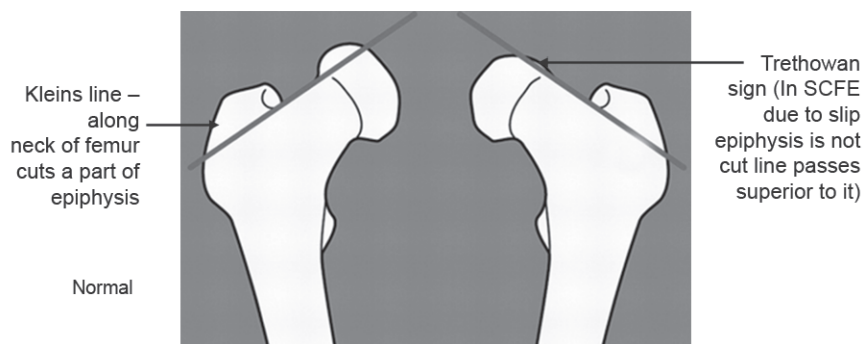


Fig. 1.12: Radiological diagnosis of slipped capital femoral epiphysis

Steel's metaphyseal sign is a crescent shaped area of increased density overlying metaphysis adjacent to physis (on AP view). It is due to overlapping of femoral neck and posteriorly displaced capital epiphysis.

A frog leg's lateral view is best for detecting mild slip.

Tc 99 scan show increased uptake in capital femoral physis in SCFE, decreased uptake with in epiphysis is highly specific for AVN. When chondrolysis is present, there is increased uptake of isotope on both sides of the joint.

MRI is useful investigation for diagnosis



Fig. 1.13: Treatment of slipped capital femoral epiphysis

1

Treatment

SCFE is usually a progressive disease that requires prompt surgical treatment. Because the changes in the chronic form occurs so slowly it is impossible to manipulate the femoral head into a better position. So treatment consists of fixing the slip in its current position and preventing progression. This is done by inserting one or more screws or pins across the growth plate (pinning in situ). Acute slips, if unstable may be gently reduced before fixation but it increases the chances of AVN.

Developmental Dysplasia of Hip (DDH) -shallow acetabulum

DDH is failure of maintenance of femoral head due to malformations of acetabulum or femur 80% of cases of DDH occur in girls. DDH is more common in first born children as primigravida uterus and abdominal muscles are unstretched and subject the fetus to prolonged periods of abnormal positioning. This crowding phenomenon is the cause of its association with torticollis and metatarsus adductus. Oligohydramnios causes limited fetal mobility and thus increases risk of DDH. Breech presentation is another strong association factor. **But the twin pregnancy does not increase the risk.** Familial association is seen. Caucasians and Native Americans have higher incidence as compared to Blacks and Asians.

Clinical Diagnosis

- Abduction is limited (especially in flexion)
- Asymmetric thigh folds
- **Barlow's Test**

1st part — In position of 90 degree flexion of hips and knees, the hip is adducted and pushed. And this will lead to dislocation of hip (but not if already dislocated)

BAAHARLO! "DAD" i.e. Barlow's test - Dislocation By Adduction (DAd).

This in Barlows we dislocate hip joint.

2nd part – Now the hip is abducted and pulled. This will cause 'clunk' indicating reduction of hip.

Some consider only 1st part as Barlow's test

- Ortolani's Test – the first two alphabets O and R (Ortolani for Reduction) and for Reduction we do abduction of hip. It is similar to 2nd part of Barlow's test
- Short limb as shown by - Higher buttock folds, Galeazzi or Allis sign is lowering of knee on affected side in a lying child with hip and knees flexed.
- Trendelenberg's test, telescoping and vascular sign of Narath is positive.

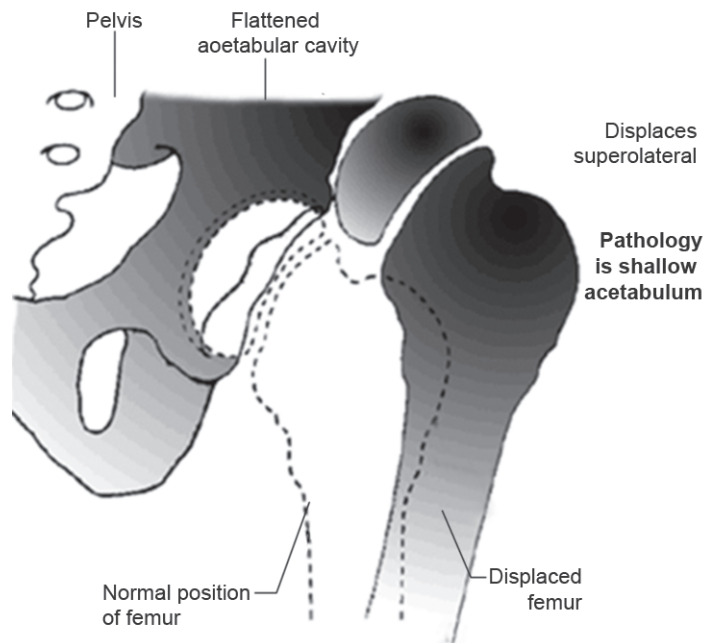


Fig. 1.14: Displaces superolateral

Dislocation <u>A</u> dduction <u>D</u> Ad	Reduction <u>A</u> bduction <u>R</u> Ab
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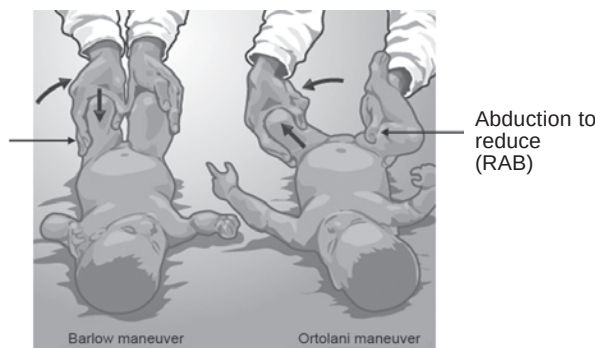


Fig. 1.15: Test for DDH

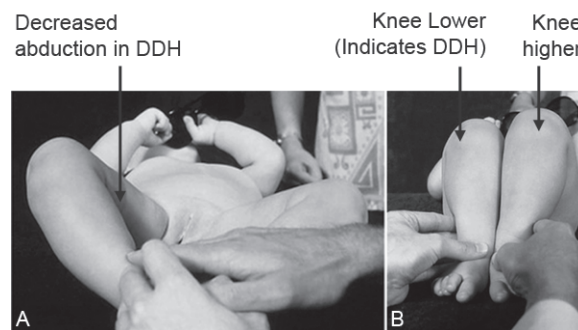


Fig. 1.16: A. Decreased abduction in DDH B. Galeazzi or Allis Test

Radiological Features

- In Von Rosen's view following parameters should be noted
- Perkin's line ;Vertical line drawn at the outer border of acetabulum
- Hilgenreiner's line; Horizontal line drawn at the level of tri-radiate cartilage.

Shenton's line: Smooth curve formed by inferior border of neck of femur with superior margin of obturator foramen.

Acetabular Index: angle between Hilgenreiner's line and line from triradiate epiphysis to lateral edge of acetabulum. Normal value is 20 – 40 degrees.(Centre edge) angle of Wiberg normal values upto 20-30 degree is angle between Perkins line and a line joining centre of epiphysis to edge of acetabulum.

- Normally the head lies in the lower and inner quadrant formed by two lines (Perkin's and Hilgenreiner's). In DDH the head lies in outer and upper quadrant
- Shenton's line is broken
- Delayed appearance and retarded development of ossification of head of femur
- Sloping shallow acetabulum
- Superior and lateral displacement of femoral head.
- **Acetabular index increases and CE angle reduces in DDH.**

Treatment Plan of DDH

Neonate and Young Child(1-6 month) –Closed reduction, Pavlik harness

6-18 months -open reduction is carried out

18-36 month

Open reduction +femoral rotation osteotomy ± pelvic osteotomy

Walking child(3 years-6 years)

Open reduction (antero lateral approach) and femoral shortening with **Acetabular reconstruction procedure:** (Salter's, Chiari's pelvic displacement and Pemberton osteotomy).

6-10 years: treatment should be avoided (fear of AVN), in bilateral DDH, in unilateral same as above.

>11 years: in cases of painful hips due to Osteoarthritis ,THR may be done (but should be delayed till skeletal maturity)



Fig. 1.17: DDH X-ray

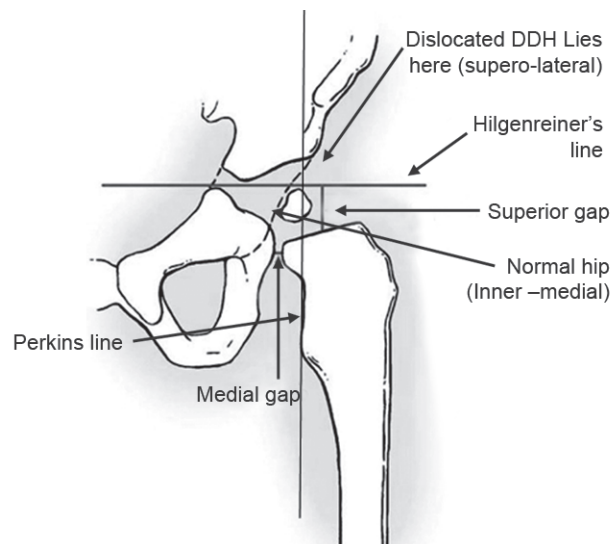
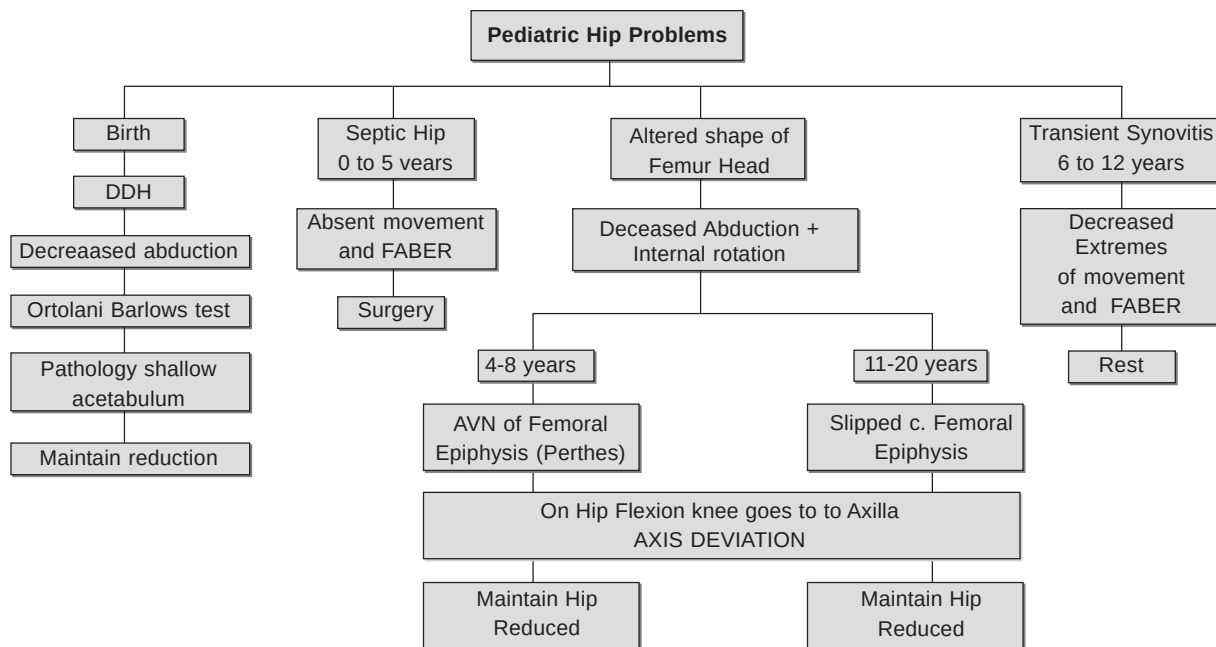


Fig. 1.18: DDH- Related anatomy



Traumatic dislocation of distal femoral epiphysis anterior and lateral

Congenital dislocation of Knee-Hyper extension (Genu recurvatum) is the most common presentation

Genu Valgum - the commonest cause of genu valgum (Knock Knee) is Idiopathic > Rickets.

NOTE: Usually OA Causes Varum/ RA Valgum

Genu Varum (Bow-Legs)

- Knee are abnormally divergent and ankles approximated. Bilateral bow legs can be estimated by measuring the distance between the medial malleoli when heels are touching; it should be < 6cm to label as Genu Varum. Normally 8 cm.
- A normal children show maximum varus at 6 months to 1 year of age, neutral alignment by 1-1/2 to 2 years of age, maximum genu valgum (8°) at 4 years of age, and a gradual decrease in genu valgum to 6 degrees by 11 years of age.
- The presence of genu varum after 2 years of age can be considered abnormal, as spontaneous resolution of the varus to neutral tibio femoral alignment by 2 years of age and to adult valgus alignment after 3 years of age is well documented.
- The causes of genu varum are similar to genu valgum except that the defective growth is on the medial side.

Two important causes are discussed below:

- Physiological genu varum**, which remains the most common etiology, even in a deformity that is slow to resolve and appears to be pathological. It is a deformity with tibio femoral angle of at least 10 degrees of varus, a radiologically normal appearing growth plate, medial bowing of the proximal tibia and often of the distal femur. The legs of most newborns are bowed, with 10-15 degrees of varus angulation. When the infant begins to stand and walk the bowing may appear more prominent and often appears to involve both the tibia and distal femur. Radiograph may be indicated if the varus deformity persists beyond 2 years of age or progresses. Non resolving, asymmetrical deformity is the main indication for radiographs.
- Tibia vara** is defined as growth retardation at the medial aspect of proximal tibial epiphysis and physis usually resulting in progressive bow leg. Two forms of deformity are

Blount distinguished, according to age at onset, two types of tibia vara: infantile, which begins before 8 years of age, and adolescent, which begins after 8 years of age but before skeletal maturity. **Nowadays following classification is followed:**

- Infantile tibia vara (Blount's disease)** in which patient is <3 years old at the onset of condition (more common). It is characterized by abrupt angulation just below the proximal physis, an irregular physal line, a wedge shaped epiphysis, and a beak like medial metaphysis. Apparent lateral subluxation of proximal tibia is often present. The triad of Blounts is Tibia vara, Genu Recurvatum (hyperextension), and internal tibial torsion(internal rotation of tibia).

Metaphysis diaphyseal angle is measured and angle more than 11 degrees require close observation

2. **Late onset tibia vara** includes Juvenile form occurring between 4 and 10 years of age and adolescent form occurring after 10 years of age.

Non physiological causes of genu varum, include skeletal dysplasia (eg. metaphyseal chondrodysplasia, spondyloepiphyseal dysplasia, multiple epiphyseal dysplasia, achondroplasia), metabolic diseases (eg. renal osteodystrophy, vit D resistant rickets), post traumatic deformity, post infectious sequelae, and proximal focal fibrocartilagenous dysplasia. In patients with familial hypophosphatemic rickets, the bone disease is active during early infancy, when physiological varus is present

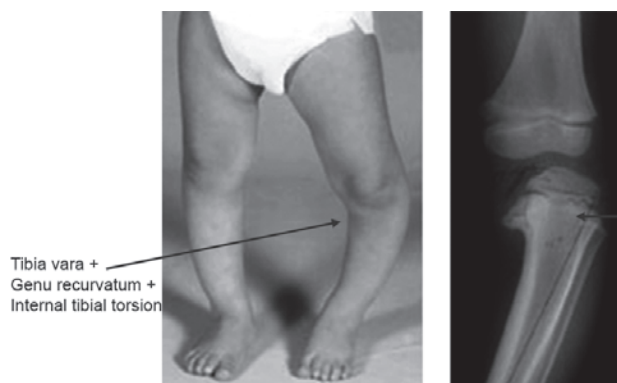


Fig. 1.19: Blounts Disease

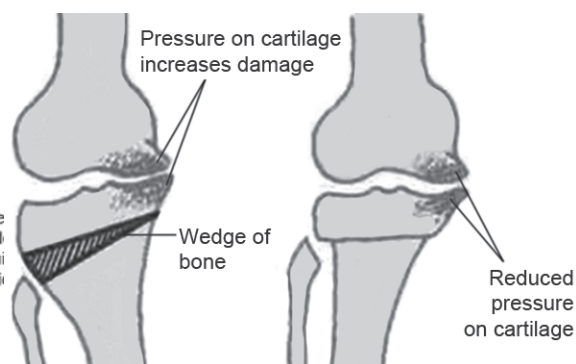


Fig. 1.20: Osteotomy to correct Varus in Blounts

- If the child is between 3 to 4 years of age HKAFOs i.e. hip knee ankle foot orthosis, medial upright elastic Blount's brace especially if there is only unilateral involvement. Full time orthotic treatment (i.e. 23 hours a day) is traditional, so that the knee is fully protected during the day.
- Surgical overcorrection of mechanical axis to at least 5 degrees valgus, with lateral translation of distal osteotomy fragment achieved by 4 years of age is believed to be optimal. The risk of delaying corrective osteotomy (even few months) past the critical age of 4 years can result in failure to achieve permanent reversal of the inhibition of proximal medial physis.
- High tibial osteotomy just distal to the patellar tendon insertion with fibular osteotomy in proximal third diaphysis is recommended.

Rocker Bottom Foot

Rocker bottom foot, is a foot with a convex plantar surface with a apex of convexity at the talar head is due to wrong correction of CTEV or oblique talus.

Treatment is Grice Procedure.



Fig. 1.21

Club Foot/ Congenital Talipes Equino Varus (CTEV)

Club is a stick to play golf CTEV foot resembles it so called as club foot.

Talipes is a generic term for foot deformity that centers around the talus (Talipes = talus and pes = foot). In its most characteristic form there are usually said to be four elements of deformity Equinus of ankle, inversion of foot, adduction of fore foot and medial rotation of tibia. In India the most common congenital anomaly is CTEV where as in western countries DDH is the commonest.



Fig. 1.22

Etiology and Associated Anomalies

- Idiopathic (most common)
- Secondary club foot:
 1. Neurological disorders and neural tube defects eg myelomeningocele and spinal dysraphism Paralytic disorder (muscular imbalance) as polio, spina bifida, myelodysplasia, and Freidreich's ataxia
 2. Arthrogryposis multiplex congenita, Larsen syndrome, Sacral agenesis, tibial deficiency, constriction rings and amniotic bands
 3. Hip deformities are associated e.g. DDH

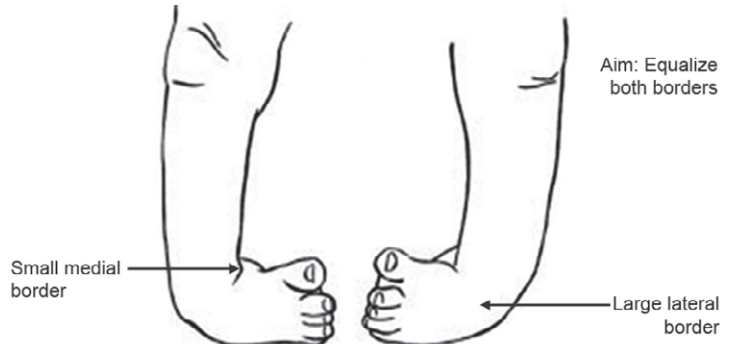


Fig. 1.23: CTEV

Pathological Anatomy

- The club foot characteristically involves foot ankle and leg. Deformities of foot may be in the hind foot (ankle and subtalar joints), mid foot (mid tarsal i.e. talonavicular and calcaneocuboid joints) and forefoot.
- **Talo calcaneo navicular joint complex** is area involved in pathomechanics of all hind foot and mid foot deformities.
- Clubfoot is always associated with a permanent decrease in calf circumference related to fibrosis of calf musculature.
- In a new born child it is possible to dorsiflex and evert the foot till the dorsum of foot and it touches anterior surface of tibia. This is not possible in CTEV. This is known as '*dorsiflexion test*' and can be used as a screening test.

Ankle (Tibio talar) Joint

Plantar flexion or Equinus

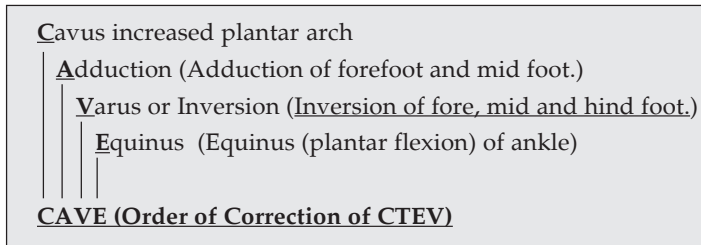
Subtalar (Talocalcaneal) Joint

- Inversion

Mid tarsal (talonavicular and calcaneocuboid) Joint

- Adduction (medial subluxation) and inversion (supination) of mid and fore foot

Pirani/Dimeglio scoring is for CTEV



- Kites angle – AP view talocalcaneal angle.
- Normal value is 20 to 40 degrees (decreased in CTEV)

MOST COMMON RELAPSE in CTEV— adduction

Conservative Management of CTEV

	Kites method –followed earlier	Ponsetti method now preferred
At birth	Manipulation by mother initial weeks	Manipulation and cast
Change of cast	Every 2 weeks	Weekly
Correction order	C-A-V-E	C-AV-E
Fulcrum while manipulating	Calcaneocuboid joint	Head of talus
Duration of treatment	6 to 9 months	6 to 8 weeks

NOTE: First cast in CTEV is applied in supination to correct Cavus. Subsequently in Kites one deformity is corrected at a time, adduction first than Varus and then Equinus. In ponsetti method adduction and Varus are corrected simultaneously and Equinus is corrected at last.

Thus in Kites method one deformity is corrected at a time but in ponsetti adduction and varus are corrected simultaneously, *equinus is corrected at end in both*.

Above knee cast: As rule of splintage immobilize one joint above one joint below and to correct ankle equinus knee has to be immobilized thus above knee cast.

If this order of correction is not followed and the equinus is corrected before adduction and inversion by forcefully dorsiflexing the foot, it may actually move at mid tarsal joints (not at ankle joint) producing rocker bottom deformity.

Even if the correction is achieved maintenance of foot in Dennis Brown splint is required whole time upto 1 year and after 1 year day time CTEV shoes and night time Dennis brown splint is used upto 7 years of age. (as recurrence after 7 years of age is not known)

The objective is to achieve (ideally) overcorrection. Sometimes it may be necessary to perform percutaneous TendoAchilles lengthening (Tenotomy) in order to overcome equinus (Ponsetti method)

Operative Treatment

The results of early operation, in particular neonatal surgery, have not been shown to be better than those of late surgery. Delaying surgery until the child is near walking age has the advantage of operating of larger foot (making surgery easier).

Posteromedial soft tissue release (Cincinnati, Crawford, Turco, Carrol incisions) is best done at young age (1 -3 years).

But in children older than 3 years of age lateral column shortening procedures are often performed in conjunction with posteromedial soft tissue release.

Posterior release or complete subtalar release can also be performed.

3-8 years

Soft tissue release together with shortening of lateral side of foot by

Lichtblau's Procedure (i.e. Shortening of calcaneal neck proximal to calcaneocuboid joint). Preferred in <6 years of age as calcaneocuboid fusion is more difficult to achieve in this age.

Evan - Dillwyn Procedure (i.e. resection and fusion of calcaneo cuboid joint)

In 3-8 years of age (esp> 6years) is ideal procedure.

Dwyer's osteotomy of calcaneum is done to correct calcaneal varus in >5 years.

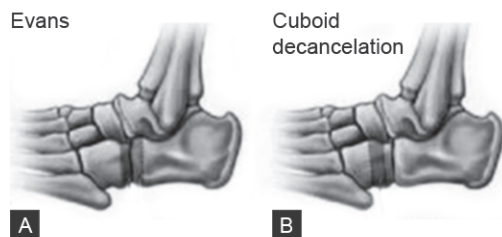


Fig. 1.27: Lateral Column Shortening



Fig. 1.24: Sequential correction

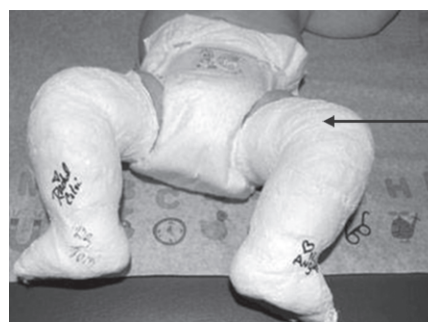


Fig. 1.25: Above knee CTEV cast

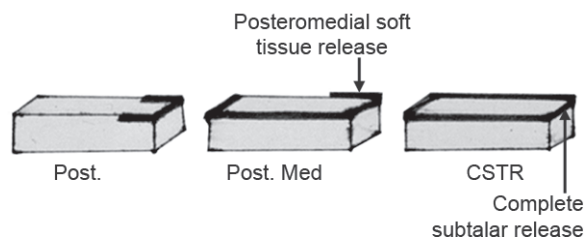


Fig. 1.26: Soft tissue releases

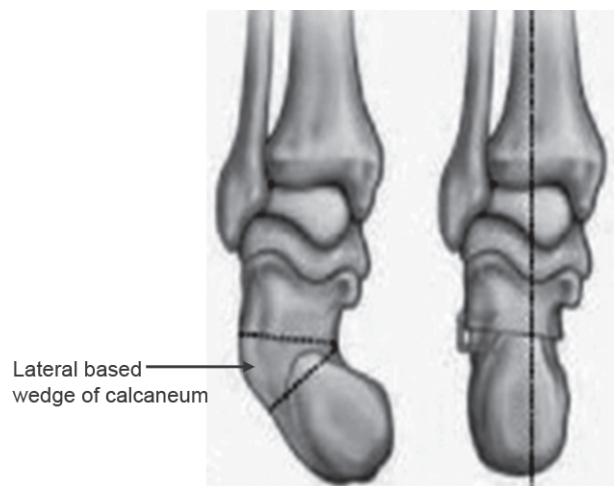


Fig. 1.28: Dwyers Osteotomy to correct heel varus (>5 yrs)

8 to 10 years

Wedge Tarsectomy is done as deformity is more and requires multiple bones to be removed.

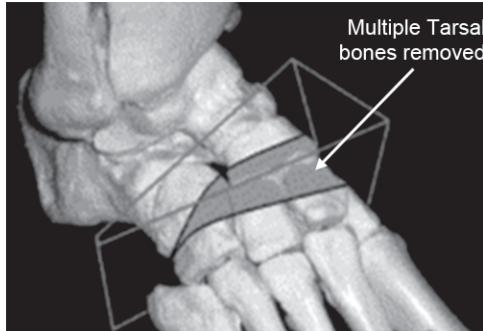


Fig. 1.29: Wedge Tarsectomy (8-10 yrs)

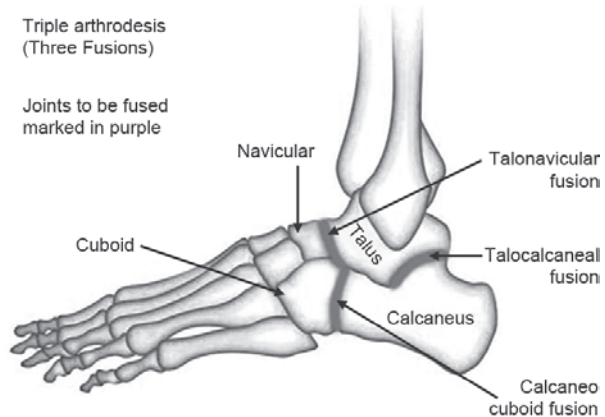


Fig. 1.30: Triple Arthrodesis (>10 yrs)

> 10 years

Triple arthrodesis is necessary for recurrent or persistent clubfoot deformity in older children (chronic cases). It is best done at > 10 years of age when foot growth is complete and the bones are ossified to achieve good fusion.

It involves fusion of three joints: **TN - Talo-Navicular; TC – Talo-Calcanal; CC – Calcaneo - Cuboid**

- Pseudoarthrosis (most commonly of talonavicular joint) is commonest complication, which can be reduced by performing surgery after skeletal maturity and doing internal fixation.
- JESS and Ilizarov external fixators also can be used to correct deformity after skeletal maturity.
- CTEV shoes has outer shoe raise, straight medial border and no heel.
- Pollicization is transposition of finger to replace (reconstruct) absent thumb done in Radial Club hand (absent radius) (AIPG 2008)

Absent or deficiency in Radius and associated with inadequately developed Thumb also called as Radial Club Hand

Absent Radius or thumb is associated with

- Trisomy 13,18
- Fanconis syndrome
- Tar syndrome(thrombocytopenia absent radius)
- Vater syndrome (vertebral anomalies,anorectal malformation/ Tracheo-oesophageal fistula/esophageal atresia/radial club hand /renal agenesis)
- Holt oram syndrome (cardiac defects with absent radius)
- Ectodermal dysplasia
- Very rarely leukemias
- Order of investigations in a patient with absent radius is Echocardiography> platelets count >karyotyping>bone marrow.

Treatment

1. Centralization of ulna
2. Pollicization is transposition of finger to replace (reconstruct) absent thumb
This reconstruction of thumb is usually done by migrating index finger to the position of thumb in a patient with congenital absence or maked hypoplasia of thumb.
3. Tendon transfers.

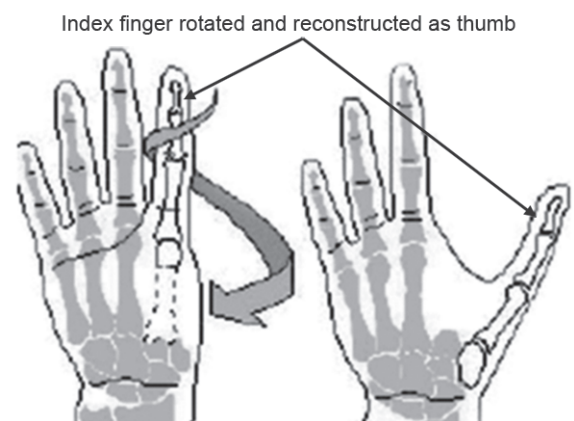


Fig. 1.31: Pollicization

FRACTURES IN CHILDREN

The immature skeleton has several unique properties that affect the management of injuries in children. These properties include thicker periosteum, soft bones, an increased resiliency to stress, an increased potential to remodel, shorter healing times, and the presence of a physis. This can lead to some characteristic fracture patterns in pediatric population.

- Distal radius and ulna is the most common site of fracture in children accounting for nearly a quarter of fracture.
- 2nd in frequency is Hand injury
- 3rd in frequency are elbow injuries amongst them supracondylar fracture humerus are most common and
- 4th common is clavicle fracture
- Please remember that Clavicle is the most common fractured bone in adults and during birth.
- * Dislocations and comminuted fractures are rare in children.

Remember most common joint to dislocate in adults is shoulder but in children is Elbow.

Remodeling Potential In Children

Remodelling of bone is best (maximum) for metaphyseal angulation deformity and least (worst) for diaphyseal rotation deformity.

Battered baby syndrome

- It is a term used to define a clinical condition in young children usually under 3 years of age who have received non accidental violence or injury, on one or more occasions at the hands of an adult responsible for child's welfare.
- This syndrome must be considered in any child
 - In whom degree and type of injury is at variance with the history given.**
 - When injuries of different ages and in different stages of healing are found.
 - When there is purposeful delay in seeking medical attention despite serious injury.**
 - Who exhibits evidence of fracture of any bone, subdural hematoma, failure to thrive, soft tissue swelling or skin bruising (ecchymosis)**

EPIPHYSEAL INJURY

Fractures characteristics

1. Inflicted fractures of the shaft are more likely to *be spiral* rather than transverse.
2. A classic finding is a chip fracture in which a corner of the metaphysis of a long bone is torn off with damage to epiphysis and periosteum.

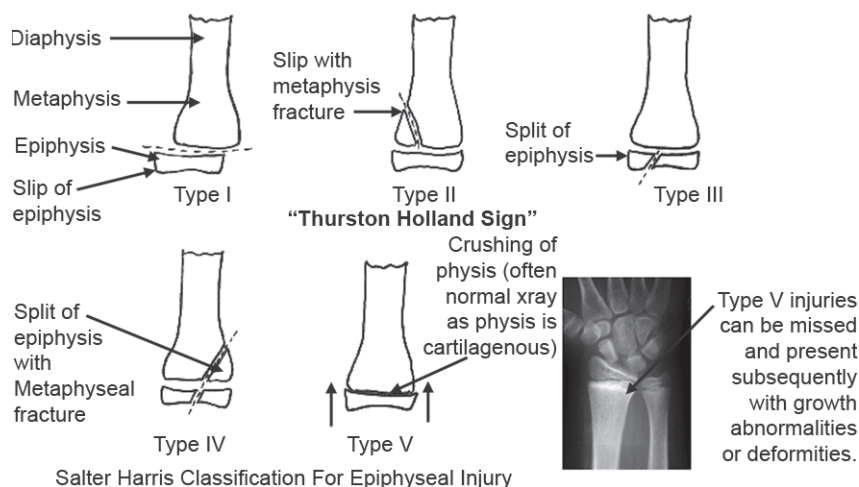


Fig. 1.32: Salter Harris Classification For Epiphyseal Injury

Epiphyseal enlargement

Most common causes of epiphyseal enlargement are chronic inflammation (e.g. JRA) due to chronic increase in blood flow. Causes of Epiphyseal enlargement are.

a. Solitary

- i. Post inflammatory (JRA, Septic arthritis)
- ii. Perthes disease (in repair stage)
- iii. Hemophilia (Hemophilic arthropathy)
- iv. Turner syndrome
- v. Trevor disease (Dysplasia epiphysealis hemimelica)

b. Generalized

- i. Hyperthyroidism
- ii. Acromegaly or cerebral gigantism
- iii. Spondyloepiphyseal dysplasia
- iv. Rickets
- v. McCune-Albright syndrome

Epiphyseal dysgenesis/Fragmented/punctate epiphysis- Hypothyroidism

klippel Feil Syndrome

Klippel Feil Syndrome is congenital fusion of one or more cervical vertebrae presenting with classical triad of low hair line, short 'web' neck (prominence of trapezius muscle), and limited neck motion seen in 50% cases.

Abnormal head position, true torticollis, and restricted range of motion, without an obvious SCM (sternocleidomastoid) contracture, is an indication for X-rays of cervical spine for evidence of cervical fusion.

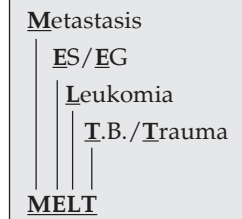
It is associated with congenital osseous fusions (synostosis) and failure of segmentation of the cervical spine, involving two or more vertebrae. Such fusions can involve the craniocervical junction (occiput to C2), the subaxial cervical spine or both; and results from a failure of the normal division of the cervical somites during the 3rd to 8th week of embryogenesis.

Vertebra Plana

Vertebra plana is collapse and increased density of one vertebral body, with normal or increased disc space. Causes are Eosinophilic granuloma (histiocytosis), Ewing's sarcoma, metastasis, leukemia, tuberculosis (very rare) and Calves' disease (osteochondritis of vertebral body).

Congenital scoliosis block vertebra carry the best prognosis and least progression.

Order of progression is unsegmented bar – with hemivertebra > unsegmented bar > hemivertebra > wedge vertebra > block vertebra. Risser localiser cast is used in the management of Idiopathic scoliosis.



Neurofibromatosis (NF)

It is hereditary, hamartomatous disorder, that affects central and peripheral nervous system, skeletal, skin and deeper soft tissue. It is one of the commonest single gene disorder affecting the skeletal system.

NF - 1/Von Recklinghausen's Disease

- Most common single gene disorder affecting human nervous system.
- Also called as peripheral neurofibromatosis, is due to defect in chromosome 17.
- AD inheritance, and 50% patients result from new mutation. 100% penetrance, i.e. individual with abnormal chromosome 17 will show same clinical feature.
- Clinical presentation includes - café au lait spots (most common feature) axillary, and inguinal freckling (2nd m.c), cutaneous neurofibromas, plexiform neurofibromas (~5% are premalignant), Lisch nodule on iris, verucous hyperplasia (thickened overgrown velvety soft skin), elephantiasis (pachydermatocoele), optic glioma, skeletal abnormalities (scoliosis, congenital pseudoarthrosis of tibia, hemihypertrophy) and cognitive deficits (learning disability).
- Complications include epilepsy, hydrocephalus, cognitive deficits, intracranial tumor, optic glioma, short stature, precocious puberty, hypothalamic dysfunction, renal artery stenosis and hypertension.

Diagnostic criteria for NF-1 are met if two or more criteria are found

- > 6 café au lait spots, at least 15mm in greatest diameter in adults and 5mm in children.
- Neurofibromas of any type or one plexiform neurofibroma
- Axillary or inguinal freckling (Crowe's sign)

- Lisch nodule (iris hamartomas)
- Optic glioma
- Musculo skeletal lesion such as sphenoid dysplasia, or thinning of cortex of long bone, with or without pseudoarthrosis
- A first degree relative (parent, sibling, or offspring) with NF-1 by above criteria.

NF-2

- Also known as central neuro fibromatosis or bilateral acoustic neurofibromatosis and is due to defect in long arm of chromosome 22.
- Less common type, AD inheritance, and 50% cases are due to new mutation.
- Musculoskeletal deformities encountered in NF – 1 are generally absent in NF – 2.
- 8th nerve vestibular schwannomas occur in nearly every individual with NF2 (not seen in NF1).
- Meningioma occur in 50% cases.

Diagnostic criteria for NF-2 are met if a person has either of the following:

- Bilateral 8th nerve masses seen on MRI
- A first degree relative with NF2 and either a unilateral 8th nerve mass or two of the following
 - Meningioma
 - Glioma
 - Schwannoma
- Juvenile posterior subcapsular lenticular opacity

NOTE: Usually Skeletal disorders are Autosomal Dominant and Inborn errors of metabolism are Autosomal Recessive.

Congenital Pseudoarthrosis

Pseudoarthrosis

It is a false joint that may develop after a fracture that has not united properly due to inadequate immobilization. If a nonunion allows for too much motion along the fracture gap, the central portion of the callus undergoes cystic degeneration and the luminal surface can actually become lined by synovial like cells, creating a false joint filled with clear fluid- known as pseudoarthrosis.

Most Common Cause of Pseudoarthrosis

Idiopathic > Neurofibromatosis (NF- 1) – (Actually an association, not a cause)

Causes of Pseudoarthrosis are

1. Neurofibromatosis (50% patients of pseudoarthrosis have NF)
2. Nonunion of fracture (including pathological fractures)
3. Congenital (mostly in lower to middle third of tibia with cupping of proximal bone end and pointing of distal bone end)
4. Osteogenesis imperfecta
5. Fibrous dysplasia
6. Cleidocranial dysplasia
7. Ankylosing spondylitis (in fused bamboo spine)
8. Post surgical eg. Triple arthrodesis, spinal fusion as a complication.
 - Tibia is most commonly involved bone. Five forms of congenital pseudoarthrosis of tibia are — dysplastic, cystic, sclerotic, fibular and clubfoot or congenital band type.
 - The most common dysplastic type is tapered at defective site; an hour glass Constriction, it is associated with neurofibromatosis.
 - Poor fracture healing and recurrent fracture is common even if union is achieved.
 - Cast immobilization is generally unsuccessful.
 - **Initial treatment is nailing and bone grafting or Ilizarov fixator.**
 - **Vascularised Fibular graft is done if multiple failed surgeries.**



Fig. 1.33: Pseudoarthrosis

19. OSTEOCHONDRITIS DISSECANS

- It is a poorly understood disorder, which leads to softening and separation of a portion of joint surface; resulting in development of small segment of necrotic bone in joint.
- Knee (lower- lateral part of medial femoral condyle) is the most commonly affected joint. Elbow (capitulum) is 2nd common.
- The cause is trauma either a single impact with the edge of patella or repeated microtrauma.
- Patient is usually adolescent male, presents with intermittent ache and swelling, localized tenderness and **Wilson's sign** (i.e. pain is felt in extension of flexed knee in medial rotation, but not in lateral rotation)
- The best X ray view is intercondylar (tunnel view-30 degrees knee flexion)
MRI can make early diagnosis of cartilagenous lesions.

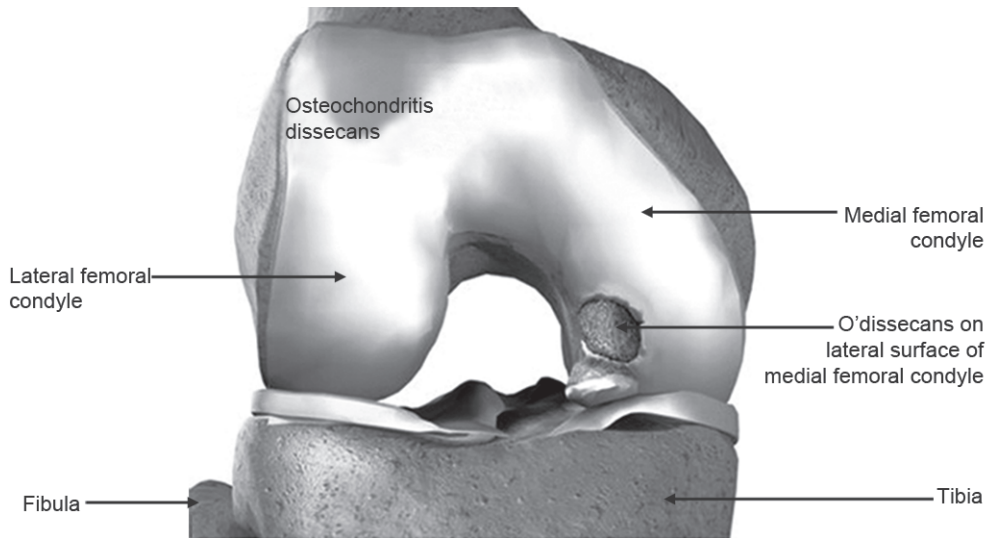


Fig. 1.34: Knee – Osteochondritis Dissecans

Treatment Options

O' Driscoll '4R' for treatment

1. **Relief by physiotherapy and pain control modalities few lesions can resolve over time**
2. **Resect**
Excision if small fragment
3. **Replace the joint surface**
4. **Restore the cartilage lesion**

Fixation with headless screws (Herbert Screw) and protected weight bearing till union.

If lesion <2 cm² – Autologous Chondrocyte Transplantation that is cartilage cells are grown in artificial media and then transplanted into cartilage defect.

Micro fracture technique or abrasion arthroplasty – Making drill holes at the base of lesion causing regeneration of fibrocartilage and filling the defect of hyaline cartilage (in normal joint). Thus it is substituting for hyaline cartilage by fibrocartilage.

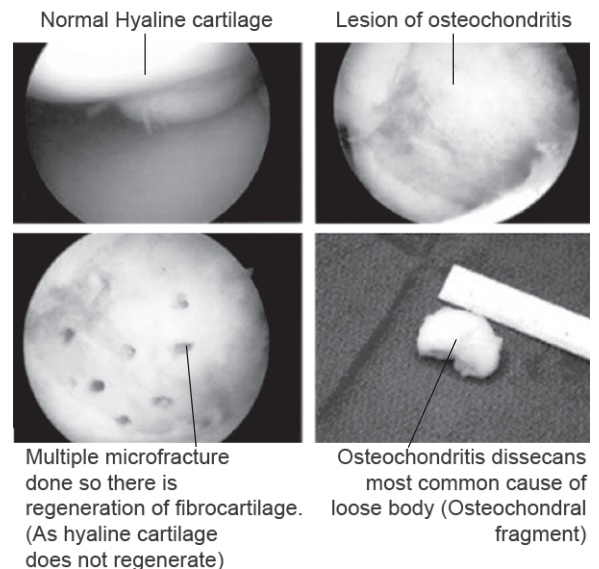
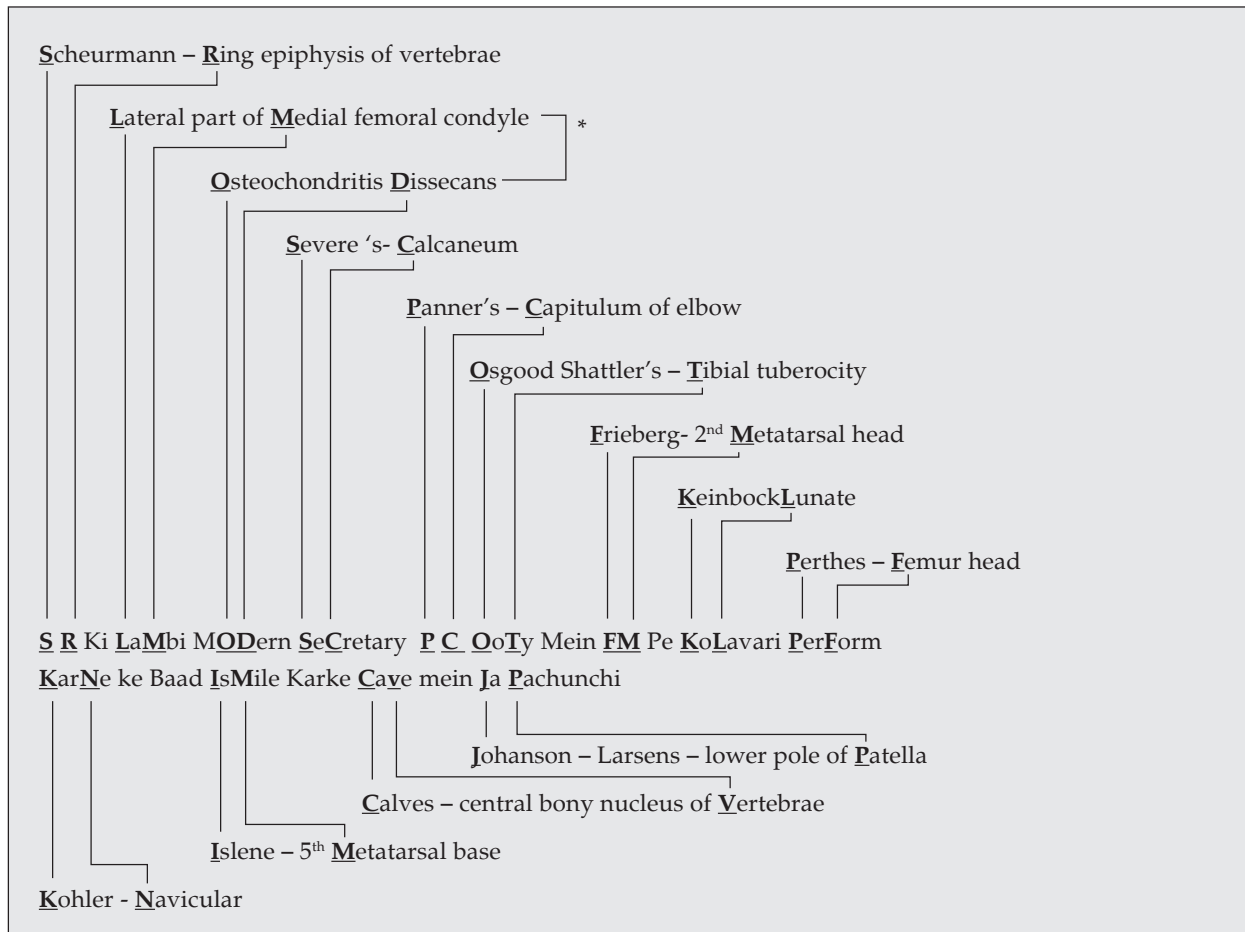


Fig. 1.35: Microfracture technique

Types of osteochondritis



20. AVASCULAR NECROSIS

Head of femur (most common)

Incidence of AVN in fracture neck Femur -Subcapital>transcervical>basicervical

Most important lateral epiphyseal branch of medial circumflex femoral artery

Scaphoid (proximal pole AVN)-because blood supply distal to proximal

Talus (Body)

Lunate

(AIPG 2012)

AVN of Femur head

Idiopathic (Chandliers disease) – most common variety

Causes of AVN of femoral head

- **Trauma:** Neck femur fracture, Posterior dislocation of hip.(>12 hour duration)
- **Substance: Alcohol, steroid use.**
- **Infection:** Septic arthritis, osteomyelitis
- **Storage disorders:** Gaucher's disease
- **Caisson disease:** Dysbaric osteonecrosis(Nitrogen accumulates)
- **Hemoglobinopathy and Coagulation disorder:** Sickel cell disease, Familial thrombophiia. Hypofibrinolysis, Hypolipoproteinemia
- **Congenital disorders:** Perthe's disease, Slipped capital femoral epiphysis.
- **Hematological malignancies:** Leukemia, lymphoma. Polycythemia.
- **Hyperlipedemia:** Nephrotic syndrome
- **Other:** SLE, ionising radiation, Pregnancy, pancreatitis, Amyloid, Renal failure **and** dialysis, Hyperparathyroidism.

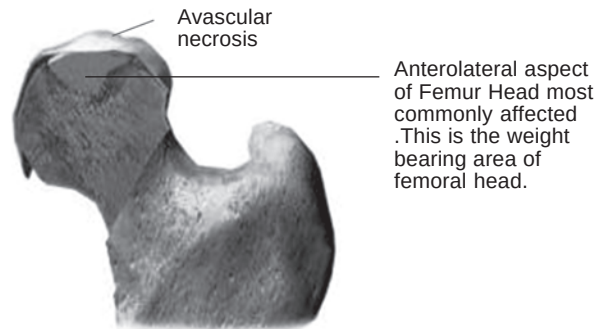


Fig. 1.36: Region of Femoral head affected in AVN

NOTE: Think AVN as an answer if mentioned any disease for which steroids are given eg Nephrotic syndrome or pemphigus vulgaris.

Ficat and arlet staging/university of Pennsylvania staging.

Limitation of abduction and internal rotation(HIV positive on therapy with decreased abduction and internal rotation consider AVN as an answer)

(AIPG 2008)

Sectoral sign clinically

Crescent sign on xrays

MRI (Investigation Of Choice) – Double line sign

Treatment

1. Early stages protected weight bearing.
2. Pre collapse stage –core decompression to decrease intraosseous pressure in femoral head(**Intra Osseous Pressure Normal 10-20 mm Hg it is 3-4 times in AVN**) drill holes are made in femoral head this procedure also opens the channels for vascular ingrowths and it is also supplemented with bone grafting(Vascular or non vascular) or electrical stimulation or Bone Morphogenic Proteins.
3. Muscle Pedicle graft –Quadratus femoris/Tensor fascia lata graft can be fixed in femoral head to augment vascularity.
4. Rotational osteotomy –To get the intact part of femoral head in acetabulum weight bearing area (anterolateral aspect of femur head)this is an extensive procedure requiring vascular repair along with it.

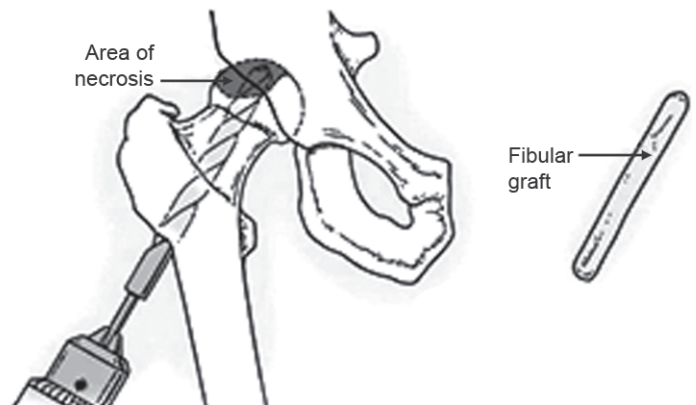


Fig. 1.37: Core decompression to decrease intra-osseous pressure

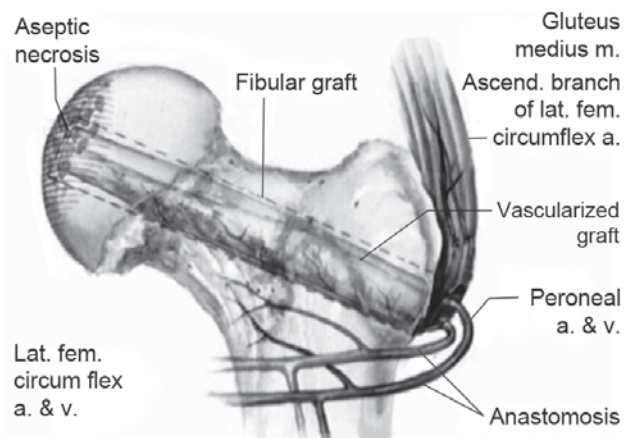


Fig. 1.38: Core dcompresion and vascularised fibular graft

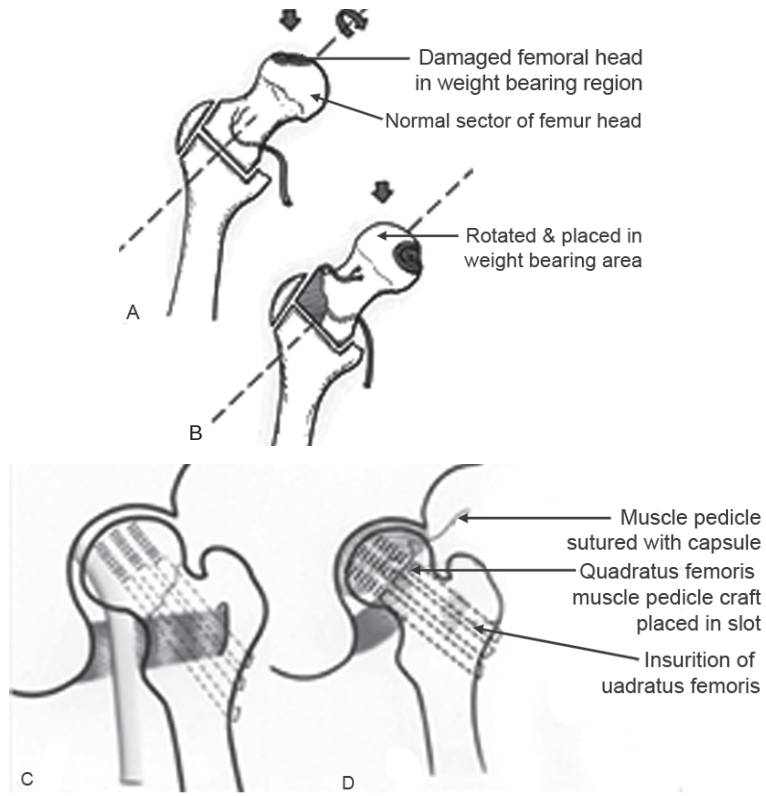


Fig. 1.39: Muscle pedicle graft

5. Arthritis/Collapse of femoral head – Total hip replacement one of the very commonly done procedure as most patients present at stage of arthritis.

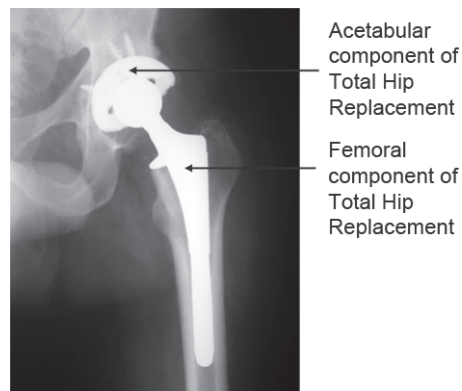


Fig. 1.40: Joint Replacement



QUESTIONS ON EXPECTED NEET PATTERN

1. A, 7 year male child complaints of absent movements of Right Lower Limb. On Examination Fever is present (High grade), local temperature is raised on Right Lower End Femur. Tenderness is present in metaphysis of Lower End Right Femur Immediately Limb is splinted according to rules of splintage. Intravenous Fluids started, Intravenous Analgesics given. Patient is sent for urgent X-rays which of the following is not true about X-ray in such scenario:
 - A. Earliest bony change of osteomyelitis is periosteal reaction.
 - B. Earliest change of osteomyelitis is loss of soft tissue planes.
 - C. Acute Osteomyelitis periosteal reaction can be solid
 - D. Chronic osteomyelitis periosteal reaction is usually sun burst appearance.

Ans. is 'D' Chronic osteomyelitis the periosteal reaction is usually sun burst appearance.

Chronic osteomyelitis the periosteal reaction is usually onion peel reaction

2. 16/M, complaints of swelling at lower end of left femur, swelling has local temperature raised, ill defined margins, variable consistency and dilated veins. On X-ray there is bony swelling from lower end of femur and there is Codman's triangle (Periosteal Reaction) all the following are required for diagnosis except: (Fig. 2.1)

- A. CT
- B. MRI
- C. Bone Scan
- D. Bone Marrow Biopsy

Ans. is 'D' Bone Marrow Biopsy

This looks like a case of malignant bone lesion for which CT, MRI and bone scan will be essential. But we will need a BIOPSY of the bone to confirm the lesion and not a bone marrow biopsy which is done for marrow disorders.

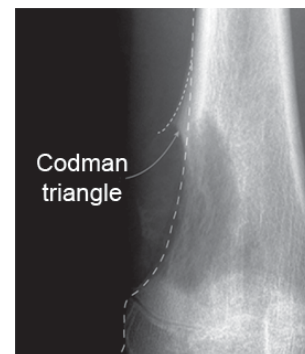


Fig. 2.1: Codman's Triangle

3. 12, M complaints of painless, bony hard swelling arising from left femoral metaphysis. Swelling has well defined margin uniform consistency and has a stalk of connection with bone. It grows away from the knee. "The swelling looks smaller on X-ray as compared to palpation on clinical examination". This swelling can undergo malignant transformation most common of which is chondrosarcoma. This malignant change is best detected by: (Fig. 2.2)

- A. MRI
- B. CT
- C. X-ray
- D. History and clinical examination

Ans. is 'A' MRI

This is a case of exostosis or osteochondroma (bony stalk with cartilage cap = osteo + chondroma) because a lesion which is larger to feel as compared to xray means that it is cartilage covered and cartilage is not seen on xrays. Malignant transformation is into chondrosarcoma, a cartilaginous tumor and cartilage is best seen on MRI. (Cartilage thickness > 2CM thickness is diagnostic).

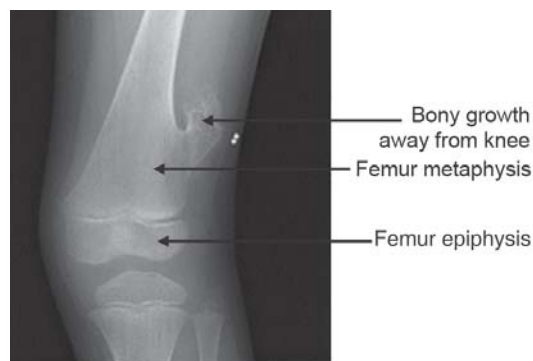


Fig. 2.2

Questions on Expected NEET Pattern

4. A 4/M complains of high grade fever, decreased appetite and pain right hip. On examination he has dehydration/ tenderness in scarpas triangle/swelling in right hip region/absent movements in right hip region. on xray there is mild increase in medial joint space. Diagnosis is (AIIMS May 2009)

A. Septic arthritis
B. Transient synovitis
C. Tubercular arthritis
D. Dislocation hip

Ans. is A. Septic arthritis

Patient is in first 5 years of life with absent movement at joint with toxic presentation goes towards septic arthritis.

5. A 7/M complains of fever and pain right hip. On examination he has swelling in right hip region, there is mild reduction in movements in right hip region. Hip is in flexion, Abduction and External rotation. On xray there is mild increase in medial joint space. Diagnosis is: (AIIMS MAY 2009)

A. Septic arthritis
B. Transient synovitis
C. Tubercular arthritis
D. Dislocation hip

Ans. is A. Septic arthritis

Patient is in age group 6 to 12 years of life with decreased movement at joint with non toxic presentation goes towards transient synovitis. Remember tubercular synovitis will have same presentation but tubercular arthritis will have Flexion, Adduction and Internal rotation thus will not be diagnosis here.

6. 30/M HIV positive on antiretroviral therapy has pain in right hip region .FLEXION, ABDUCTION, EXTERNAL ROTATION DEFORMITY of right hip for 2 months, what is the most likely diagnosis: (AIPG-2008)

A. Avascular Necrosis
B. T.B Hip
C. Transient synovitis
D. Septic arthritis

Ans. is 'B' T.B. Hip

	T B hip in HIV	AVN hip in HIV
Incidence	More Common	Less Common
Deformity	FABER-stage of synovitis may be prolonged on treatment than subsequently with onset of arthritis – FADIR	Limitation of abduction and internal rotation so initially position is adduction and external rotation (opposite to movements limited)and than subsequently with onset of arthritis FADIR
	Unilateral usually	Bilateral usually

7. Wandering acetabulum is seen in (AIIMS 93)

A. Fracture acetabulum
B. Dislocation of femur
C. CDH
D. Tuberculosis of hip

Ans. is 'D' Tuberculosis of hip;

• Wandering acetabulum is seen in tuberculosis of hip stage 4 when destroyed head dislocates from the acetabulum.

8. A five year old child is suffering from painful restriction of all movements of hip joint, the most likely cause in our country is: (Orissa 90)

A. Congenital coxa vara
B. Tuberculosis arthritis
C. Perthes' disease
D. Sequelae of septic arthritis of infancy

Ans. is 'B' Tuberculosis arthritis

T.B. arthritis is the most common cause of reduced joint movements of hip joints in young patient in india.

- Sequelae of septic arthritis of infancy causes increased movements due to destruction of femur epiphysis (Tom Smith Hip).
- Tuberculosis is much more common than Coxa Vara or Perthes in India.

9. Diagnosis of the marked lesion is: (Fig. 2.3)

A. Osteochondroma
B. Osteoid osteoma
C. Aneurysmal bone cyst
D. Enchondroma

Ans. The marked area here is a bony growth from metaphysis ,going away from the joint hence osteochondroma or exostosis is the preferred answer here .

Osteoid osteoma is a cortical lesion not a growth and ABC and Enchondroma are lytic lesions in the metaphysis they are not growths as seen here.

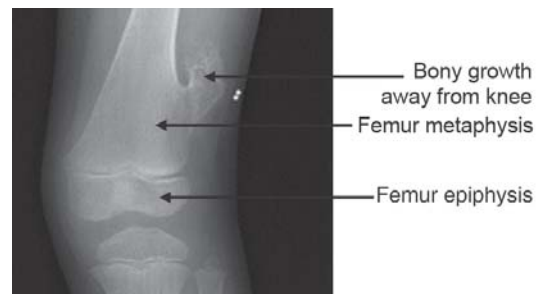


Fig. 2.3

10. This image goes in favour of what malignancy: (Fig. 2.4)

- A. Ewings sarcoma B. Osteosarcoma
C. Multiple Myeloma D. Chondrosarcoma

Ans. is 'B' Osteosarcoma

- Lets understand the sequence of answering such questions
- This looks like lower end of femur and physis is just closing thus we are dealing with a metaphyseal 2nd decade lesion of femur. (lower end femur epiphyseal fusion occurs about 18 years)
- Lesion is metaphyseal hence multiple myeloma and ewings sarcoma are ruled out as they are diaphyseal
- The lesion does not have calcified or radiodense masses the hallmark of cartilagenous lesions so chondrosarcoma is ruled out. The lesion has metaphyseal location with codmans triangle so osteosarcoma is likely but needs confirmation with biopsy.

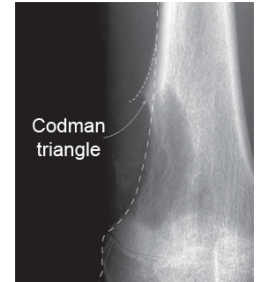


Fig. 2.4

11. Another name for ivory osteoma is:

- A. Compact osteoma B. Forrester's disease
C. Diaphyseal aclasia D. Codman's tumor

Ans. 'A' Ivory osteoma or compact osteoma or eburnated osteoma are most commonly seen in skull vault. They are associated with Gardner's syndrome. They are usually asymptomatic requiring no treatment.

12. Diagnosis: (Fig. 2.5)

- A. Aneurysmal bone cyst B. Giant cell tumor
C. Fibrous cortical defect D. Simple bone cyst

Ans. is 'D' Simple bone cyst

Simple/Unicameral bone cyst On x ray it is centrally located, radiolucent lesion of the metaphysis that is slightly and symmetrically expansile. The transverse diameter of the cyst close to the epiphysis is as wide as epiphysis. The cortex is attenuated and thinned from medullary aspect (scalloping). Fallen leaf (fragment) sign is pathognomonic manifestation and represents that fractured fragment of bone settles to the most dependent portion of cyst because of its unicompartamental nature.



Fig. 2.5

13. All are true except:

- A. Surest sign of fracture is Crepitus
B. Surest sign of fracture is abnormal mobility
C. Surest sign of fracture is failure to transmit the movements proximally
D. Commonest sign of fracture is tenderness

Ans. is 'A' Commonest sign of fracture is tenderness, surest sign of fracture is abnormal mobility and failure to transmit the movements proximally. There are two schools of thoughts for crepitus being a sign of fracture one says it's a reliable sign second says it should be never elicited because it can cause neurogenic shock and can cause comminution at the fracture site. Thus all other choices are correct so best answer is (a) here.

14. Mirel's criteria is developed for the evaluation of

- A. Risk of fatigue fracture B. Severity of osteoporosis
C. Risk of pathological fracture D. Severity of neurological deficit

Ans. is 'C' Risk of pathological fracture

Mirel's Criteria For Risk of Pathological Fracture:

- Mirel's developed a scoring system based on, the presence or absence of pain, the size, location, and radiographic appearance of the lesion to quantify the risk of impending pathological fracture in **malignant lesion**.
- So patients with maximum risk of pathological fracture are having lytic peritrochanteric lesion involving >2/3 diameter with severe pain
- Patients with ≤ 7 score are observed, but those with 8 or more should have prophylactic internal fixation.

15. An army recruit, smoker and 6 months into training started complaining of pain at postero medial aspect of both legs. There was acute point tenderness and the pain was aggravated on physical activity.

- A. The most likely diagnosis is Stress fracture
R. Stress fracture in this case is due to abnormal force over normal bone.

- A. A and R both correct and R is explanation of A
- B. A and R both correct but R is not explanation of A
- C. A correct R wrong
- D. A wrong R correct

Ans. is 'A' A and R both correct and R is explanation of A

Stress Fracture: The diagnosis here is stress fracture because of

1. Prolonged activity
2. Bilateral symptoms
3. **Specific Bony tenderness. It has 2 causes.**

- **Fatigue Fracture:** caused by application of abnormal force on normal bone. (As the case here)
- **Insufficiency Fracture:** caused by normal force on weak bone.

16. A 15/male history of trauma to left elbow 7 days back was initially treated by osteopath who did massage on his left elbow now he presents with severe pain in that elbow. His passive stretch pain is absent. In such a condition often swelling is seen in which ossification is seen:

- A. Uniform throughout
- B. Inside out
- C. Outside in
- D. None

Ans. is 'C' Outside in

Traumatic elbow with history of massage is a case of myositis ossificans and here the calcification is more in periphery called as outside in calcification.

17. All the following are true except:

(AIPG 2012/May AIIMS2012)

- A. Posterior dislocation of shoulder has Hill Sachs lesion at Anteromedial part of humeral head.
- B. Anterior dislocation of shoulder has Hill Sachs lesion at Posterolateral part of humeral head
- C. Lift off test is for Subscapularis
- D. Bankarts lesion involves posterior part of glenoid labrum

Ans. is 'D' Bankarts lesion involves anterior part of glenoid labrum.

Hill- Sachs Lesion

- It is compression fracture of the postero lateral articular surface of humeral head (more specifically on superior aspect) these "defects are often referred to as "impression fractures".
- In anterior dislocation these defects are created on the posterolateral aspect of humeral head and referred to as Hill Sachs lesion.
- In posterior shoulder dislocation these defects are created on anteromedial aspect of humeral head and referred to as reverse Hill Sachs lesion.
- Lift off test is for subscapularis.

18. In a fracture shaft humerus which of the following complication requires immediate surgery:

- A. Compound fracture
- B. Nerve injury
- C. Brachial artery occlusion
- D. Comminuted fracture

Ans. is 'C' Brachial artery occlusion

Indications of emergency surgery in orthopaedics:

- Vascular injury
- Open injury
- Joint instability
- Progressive neural injury

19. The first sign of compartment is:

- A. Paresthesia
- B. Pain on passive extension of fingers
- C. Pain on active extension of fingers
- D. Swelling of fingers

Ans. is 'B' Pain on passive extension of fingers

20. C5-C6 Fracture Dislocation Young Individual With Quadriplegia:

(AIPG 2007)

- A. Immediate Anterior Decompression
- B. Cervical Traction Followed By Instrument Fixation
- C. Hard Cervical Collar And Bed Rest
- D. Cervical Laminectomy

Ans. is 'B' Cervical Traction Followed By Instrument Fixation

- Acutely traumatic spine is initially put on rest and traction so that there is reduction in traumatic oedema hence immediate anterior decompression and cervical laminectomy is not indicated here.
- Bowel ,bladder involvement is an indication for urgent surgery also is increasing neurological deficit but none of them is mentioned here. Patient has to be managed by reduction of dislocation hence collar and rest are not sufficient to reduce the dislocation. It must also be noted here that spinal disruption with neural deficit is mentioned here which is an indication of surgery, after initial traction the spine dislocation is reduced and than anterior decompression and stabilization is performed.

21. **Material used for this technique is: (Fig. 2.6)**

- Nitrous oxide
- Liquid Nitrogen
- Poly methyl methacrylate
- Poly ethyl methacrylate

Ans. is 'C' Polymethyl methacrylate

Vertebroplasty: It is a surgical procedure used in compression type vertebral fracture (any fracture due to osteoporosis/trauma or tumor) to gain vertebral height and to reduce amount of pain. Artificial bone cement made up of PMMA is used in this technique.



Fig. 2.6

22. **This is characteristic posture in: (Fig. 2.7)**

- Anterior dislocation of hip joint
- Posterior dislocation of hip joint
- Fracture of femoral head
- Fracture shaft of femur

Ans. is 'B' Posterior dislocation of hip joint

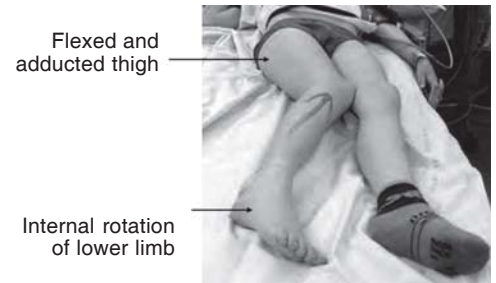


Fig. 2.7: FADIR

23. A 25/M suffers from disease process involving right hip causing hip instability. He is asked to bear weight on left lower limb since this hip is normal his muscles/joint on left side (G. medius and minimum) can prevent drop of hemipelvis on right side but when he bears weight on right side his muscles/joint are affected and cannot prevent drop of hemipelvis on left side so for normal trendelenburg test – femoral head/neck / joint/G. medius/minimum (supplied by superior gluteal nerve) should be intact. Trendelenburg test is positive in a/e: (Fig. 2.8)

(AIIMS Nov 2008)

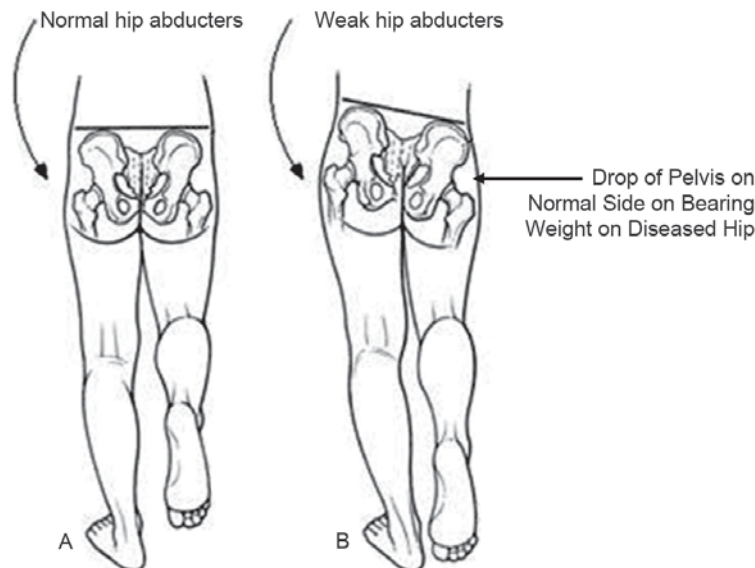


Fig. 2.8: Trendelenburg Test

- A. Dislocation hip
C. Superior gluteal nerve palsy
B. Non union neck femur
D. T.B hip

Ans. is 'D' T.B hip

T.B hip Trendelenburg is usually negative except stage 4 and 5, all other conditions here trendelenburg test is positive.

- 24. A 30/M met with an accident and sustained bilateral shaft femur fracture. 2 days later he developed breathlessness and crepts were present in chest. to establish his diagnosis Gurd criterion are used in which major criterion include all except:**

- A. Pulmonary edema
C. CNS depression
B. Thrombocytopenia
D. Axillary or sub conjunctiva petechiae

Ans. is 'B' Thrombocytopenia is minor criterion

- 25. All the following are True except:**

- A. Supracondylar fracture is closed reduced
B. Lateral condyle humerus is open reduced
C. Forearm fracture in children is closed reduced and cast applied
D. Neck femur fracture in geriatrics is treated with open reduction and screw fixation.

Ans. is 'D' Neck femur fracture in geriatrics is treated with open reduction and screw fixation.

- Extra articular fracture are closed reduced and intraarticular fracture are open reduced. Supracondylar fracture humerus is extrarticular and lateral condyle fracture is intrarticular.
- Neck femur in geriatrics is usually treated by hemiarthroplasty.

- 26. All are true except:**

(AIIMS May 2011) (May AIIMS 2012)

- A. In 'bounce home' test of knee 'end feels' are interference 'end feels' are Hard/ Firm/ Spongy:
B. Dial test is for Posterolateral corner
C. Pivot Shift test is for Anterolateral corner
D. Anterior drawer test is only for knee joint

Ans. is 'D' Anterior drawer test is only for knee joint.

Anterior drawer test can be performed for shoulder, knee and ankle.

- 27. Which one of the following tests will you adopt while examining a knee joint where you suspect an old tear of anterior cruciate ligament?**

- A. Posterior drawer test
C. Lachman test
B. Mc Murray test
D. Pivot shift test

Ans. is 'C' Lachman test

Lachman's test is the most sensitive test for anterior cruciate ligament tears. It is done with the knee. flexed at 20 degrees. So it can be done in acute as well as chronic injuries. (because in acute cases with hemarthrosis more flexion is usually not possible so performing anterior drawer test is difficult)

- 28. Diagnosis of the following images: (Fig. 2.9)**

- A. Spondylolisthesis
B. Spondylolysis
C. Disc Prolapse
D. Vertebral Fracture

Ans. Mri shown above if traced from top of image we can appreciate there is well hydrated intervertebral discs and CSF space is open but as we go towards the lower part of image we are able to appreciate that at lumbosacral junction one of the disc is black, prolapsed, compressing on CSF and neural structures. Thus it's a case of disc prolapse.

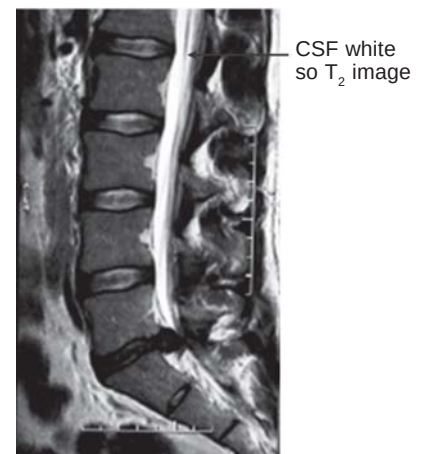


Fig. 2.9: MRI Lumbosacral Spine

29. This sign is associated with: (Fig. 2.10)

- A. Dequervains disease B. Dupuytren's Contracture
C. Carpal jtunnel syndrome D. Any of the above

Ans. is 'A' Dequervains disease

De Quervain's Disease

- The abductor pollicis longus and extensor pollicis brevis tendons may become inflamed beneath the retinacular pulley at the radial styloid with in the first extensor compartment.
- Finkelstein's test. The examiner places patients' thumb across the palm inside the fist, and then holding the patient's hand firmly, turns the wrist sharply into adduction. In positive test this is acutely painful; repeating the movement with the thumb left free is relatively painless.

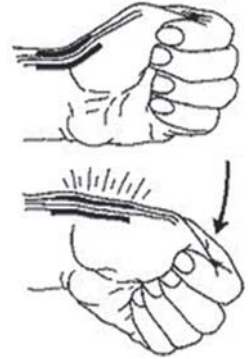


Fig. 2.10: Finkelstein Test

30. A patient has decreased sensation over tip of index and middle finger, he has weakness of finger flexors – (PIP and DIP Flexion of index and middle finger are weak) the nerve involved is:

- A. Ulnar B. Median
C. Radial D. PIN

Ans. is 'B' Median

- Autonomous zones of nerves are
- Median nerve –Tip of index finger and middle finger
- Ulnar nerve –tip of little finger
- Radial nerve – Dorsum of 1st web space
- The index and middle finger flexion is carried out by Flexor Digitorum Profundus supplied by Anterior interossei nerve a branch of median nerve

31. "Tinel's sign" indicates

- A. Neurofibroma B. Injury to peripheral nerves
C. Atrophy of nerves D. Regeneration of nerves

Ans. is 'D' Regeneration of nerves

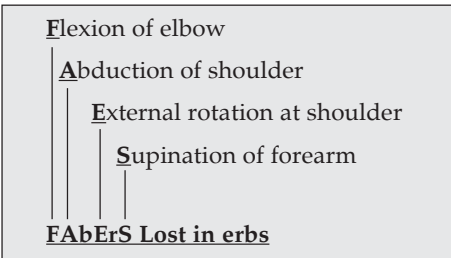
Tinels sign – on tapping along the course of nerve at the area of nerve damage there will be tingling sensations felt along the distal course of nerve. Thus if nerve recovers it will progress distally. **Thus it Records regeneration rate. Disappears as myelinization takes place (Rate of nerve Recovery: 1mm/day)**

32. This characteristic posture is seen in (Fig. 15.26)

- A. Total brachial palsy B. Klumpkes palsy
C. Erb's palsy D. Ulnar Nerve injury

Ans. 'C' Erb's palsy

Erb's Palsy has Waiters Tip Hand (Adducted and internally rotated arm) (Fig. 2.11)



Police man/
Waiter's Tip
Hand

Fig. 2.11

33. This sign is used to test: (Fig. 2.12)

- A. Ulnar nerve
- B. Radial nerve
- C. AIN
- D. Median

Ans. is 'C' AIN

The muscles FDP and FPL are supplied by Anterior Interosseous. Nerve and sign shown is Kiloh Nevin Sign.

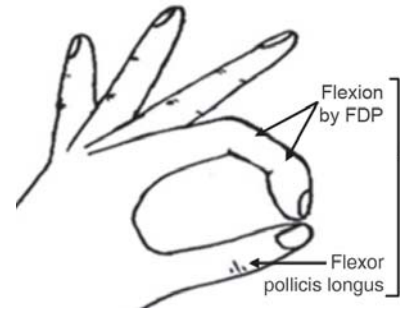


Fig. 2.12: Kiloh Nevin Sign

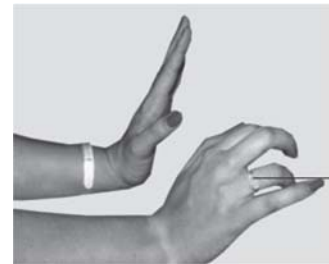
34. A person is not able to extend his metacarpophalangeal joint.

This is due to injury to which nerve injury: (Fig. 2.13)

- A. Ulnar nerve
- B. Radial nerve injury
- C. Median nerve injury
- D. Posterior Interosseus nerve injury

Ans. is 'D' Posterior Interosseus nerve injury

Thumb drop or Finger drop (inability to extend MCP) — Specifically in posterior interosseous nerve (PIN) injury.



This is due to injury to which nerve injury

Fig. 2.13

35. A 30/M complains of dyspepsia, multiple bone pains, history of renal colic and irritative behaviour. On X-ray of his right leg there is a lytic cavity in middle of tibia. His blood investigations are as follows:

- | | |
|--|------------------------------|
| 1. Hgm with ESR normal | 2. Serum Ca – 12.2mg/dl |
| 3. Serum PO_4^{3-} – 2.0mg/dl | 4. Vit D_3 – Normal |
| 5. Serum PTH 1000 | 6. TSH – Normal |
| 7. ALP – 600IU... AI 2010.. | |
- A. Primary Hyperparathyroidism
 - B. Secondary Hyperparathyroidism
 - C. Osteomalacia
 - D. Osteopetrosis

Ans. is 'A' Primary Hyperparathyroidism

- This case has high serum calcium (normal values 8.8 to 10.8 mg/dl)
- Low serum phosphate (Normal value is 2.5 to 4.5 mg/dl)
- Serum PTH is high (normal value is upto 60 pg/ml) and high ALP. This combination along with the clinical presentation of weak Bones, Psychic moans, Abdominal groans and renal stones goes towards Primary hyperparathyroidism as secondary hyperparathyroidism usually does not have classical features has variable calcium and phosphate levels and do not have such high PTH levels thus primary hyperparathyroidism will be a preferred answer here although secondary hyperparathyroidism can have this presentation thus the answer will be primary >secondary hyperparathyroidism. Osteomalacia will have low calcium or low vitamin D levels and osteopetrosis usually has normal Ca, normal PO_4 and high ALP.

36. Diagnosis of a patient with the following x ray of wrist is: (Fig. 2.14)

- A. ScurvyB. Hemophilia
- C. Rickets
- D. Hyperparathyroidism

Ans. is 'C' Rickets

- Widened physis (growth plate)/Cupped and frayed metaphysis are seen here so diagnosis is Rickets
- Epiphyseal dysgenesis/Fragmented/punctate epiphysis are seen in Hypothyroidism
- Small epiphysis margined by sclerotic rim (wimberger sign) and calcified rdiodense mataphyseal end (Frankel's line) is seen in scurvy
- Hyperparathyroidism causes bone resorption.



Cupping, Splaying and Flaring of radius and ulna

Fig. 2.14

37. All the following are "head at risk signs" (radiological) that correlate positively with poor results in the outcome of Perthes' disease except
- Lateral subluxation of the femoral head
 - Speckled calcification lateral to the capital epiphysis
 - Shallow acetabulum
 - Gage sign-a radiolucent 'V' shaped defect in the lateral epiphysis and adjacent metaphysis.

Ans. is 'C' Shallow acetabulum is associated with DDH not with Perthes.

38. This may be seen in all of the following conditions except: (Fig. 2.15)

- Fracture
- Idiopathic
- Neurofibromatosis
- Osteomyelitis

Ans. is 'D' Osteomyelitis

39. A 8 years old male with painless limp on examination and restricted abduction and internal rotation left hip on hip flexion Knee goes toward axilla, probable diagnosis: is

- Septic arthritis of hip
- Tuberculosis arthritis of hip
- Cong dislocation of hip
- Perthes disease

Ans. is 'D' Perthes Disease

40. Assertion/Reasoning

- A. Treatment of club foot should begin as soon as possible after birth with cast.
R. Most reliable and best results are for cast application at the earliest after birth.

- A and R both correct and R is explanation of A
- A and R both correct but R is not explanation of A
- A correct R wrong
- A wrong R correct

Ans. is 'A' A and R both correct and R is explanation of A
Treatment of CTEV

- At birth cast (Ponsetti method)
- < 1 year-cast
- 1-3 year-soft tissue release eg PMSTR (posteromedial soft tissue release)
- >3 years of age-soft tissue release + bony procedure(lateral based wedge osteotomy)
- 3-5 YEARS: Shortening of lateral column of foot (Cuboid or calcaneal wedge resection-Evan's procedure) + soft tissue release.
- 5-8 years: Dwyer's osteotomy to correct heel varus + Evan's procedure + soft tissue release.
- 8-10 years: Wedge tarsectomy.
- After 10 years: Triple arthrodesis.

41. 35 year old male on prolonged steroids diagnosed a case of Avascular Necrosis of femoral head present with the following X-ray what is most appropriate treatment for right hip. (Fig. 2.16)

- Wait and Watch
- Core Dx
- MPG
- THR

Ans. is 'D' THR

Arthritis/Collapse of femoral head is seen here – Total hip replacement is the procedure of choice.

42. Assertion/ Reasoning on AVN

- I. In AVN of hip in Extended position internal rotation is almost full and it is restricted on flexion of Hip.



Pseudo arthrosis – false joint! Cause unknown!

Fig. 2.15



Painful right hip with absent joint space

Fig. 2.16: X-ray Pelvis with bilateral Hip

II. This phenomenon is due to involvement of one sector on femoral head and called as sectoral sign.

- A. A and R both correct and R is explanation of A
- B. A and R both correct but R is not explanation of A
- C. A True and R wrong
- D. A wrong and R true

Ans. is 'A' characteristic sign in AVN of femur head is a tendency for hip to twist into external rotation during passive flexion; this corresponds to the 'Sectoral sign' in which, with the hip extended, internal rotation is almost full but with hip flexed it is grossly restricted.

TRUE/FALSE

43. Which of the following is True about avascular necrosis of femoral head

- A. Avascular necrosis initially involves a part of femoral head
- B. Most common cause of avascular necrosis is steroid intake
- C. Most commonly anteromedial part of femoral head is involved
- D. Once arthritis sets in Avascular necrosis is best managed by strict bed rest.

Ans. is

- A. **True** because avascular necrosis has sectoral involvement initially that is it only involves one sector of femoral head
- B. **False** because most commonly avascular necrosis is idiopathic
- C. **False** because most commonly avascular necrosis involves anterolateral part of femoral head.
- D. False once arthritis sets in Replacement of the joint is the best option.



DNB QUESTIONS

QUESTIONS FROM THE LATEST TOPICS

1. Ivory Osteoma is also called as:

- A. Campanacci Disease
- B. Codmans Tumor
- C. Compact or Eburnated Osteoma
- D. Mafucci syndrome

Ans. is 'C' Compact Osteoma

Ivory osteoma is called as compact or eburnated osteoma, Codmans tumor is chondroblastoma, Campanacci disease is ossifying fibroma and Mafucci syndrome is enchondroma, thomangioma + phlebolith.

2. Purely epiphyseal lesion before skeletal maturity is:

- A. Giant cell tumor
- B. Chondroblastoma
- C. Osteoblastoma
- D. Osteosarcoma

Ans. is 'B' Chondroblastoma is purely epiphyseal lesion before skeletal maturity.

3. Fracture clavicle all the following are used for treatment except:

- A. Figure of eight bandage
- B. Plating
- C. K wire fixation
- D. Bone grafting

Ans. is 'D' Bone grafting

Treatment for fracture clavicle is usually non operative but can be operated and fixation method can be plating or k wire fixation. Bone graft is usually not required for fracture clavicle.

4. Most common tendon used as tendon graft is:

- A. Palmaris Longus
- B. Flexor digitorum profundus
- C. Biceps brachii
- D. Gluteus medius

Ans. is 'A' Palmaris longus is commonest tendon used as a graft

5. Thomas Test is for:

- A. Hip deformity
- B. Knee deformity
- C. Tendoachilles tear
- D. Impingement syndrome of shoulder

Ans. is 'A' Hip deformity

Tendoachilles tear is tested by Thompson test and impingement syndrome of shoulder is tested by Neers test and Hawkins Kennedy test.

6. Slipped Capital Femoral Epiphysis what is relation to the femoral metaphysis after slip:

- A. Anterolateral
- B. Posterolateral
- C. Anteromedial
- D. Posteromedial

Ans. is 'D' The slipped epiphysis is related to the posteromedial part of femoral metaphysis in case of SCFE.

7. Medial Arch most important muscle is:

- A. Tendoachilles
- B. Tibialis posterior tendon
- C. Extensor Hallucis longus
- D. Adductor pollicis

Ans. is 'B' Tibialis posterior tendon

Medial longitudinal arch most important muscles for maintaining the arch are Tibialis posterior and Tibialis anterior in this order and most important bones are Talus and Navicular.

8. Terry Thomas is sign seen in:

- A. Scaphoid fracture
- B. Scapholunate dissociation
- C. Fracture acetabulum
- D. Meniscus cyst

Ans. is 'B' Terry Thomas sign refers to gap seen between scaphoid and lunate in scapholunate dissociation seen as below compared to space between teeth of terry Thomas.



Fig. 3.1: Terry Thomas Sign

9. Rheumatoid Arthritis most common Part of Spine affected: (DNB 2012)

- A. Upper cervical spine
- B. Lower cervical spine
- C. Dorsal spine
- D. Lumbar spine

Ans. Rheumatoid arthritis is a disease of appendicular spine and when involves axial skeleton involves upper cervical spine.

10. Anatomical Snuff Box tenderness indicates fracture of:

- A. Scaphoid fracture
- B. Lunate fracture
- C. Talus fracture
- D. Navicular fracture

Ans. Anatomical snuff box refers to space bound by Anteriorly by Abductor pollicis longus and extensor pollicis brevis and posteriorly by extensor pollicis longus and the floor contains scaphoid and trapezium.

11. Varus or Valgus deformity is seen in which plane of body":

- A. Sagittal plane
- B. Coronal Plane
- C. Transverse plane
- D. Oblique plane

Ans. Varus deformity refers to movement of distal part towards midline and valgus refers to movement of distal part away from midline and they are seen in coronal plane.

DNB QUESTIONS FROM 1992 – 2011

1. In genu valgus, the deformity is tibia and fibula:

(DNB 2011)

- A. Tilted laterally in relation to long axis of femur
- B. Tilted medially in relation to femur
- C. Rotated medially in relation to femur
- D. Rotated laterally in relation to femur

Ans. is 'A' Tilted laterally in relation to long axis of femur

Varus distal part goes towards midline and valgus distal part away from midline

2. Felon is seen in:

(DNB 2011)

- A. Index finger
- B. Thumb
- C. Great toe
- D. Ring finger

Ans. is 'B' Thumb

Felon is infection of pulp space of finger and is seen in Thumb > index finger

3. Spina ventosa is:

(DNB 2011)

- A. TB spine
- B. TB hip
- C. TB dactylitis
- D. TB knee joint

Ans. is 'C' TB dactylitis

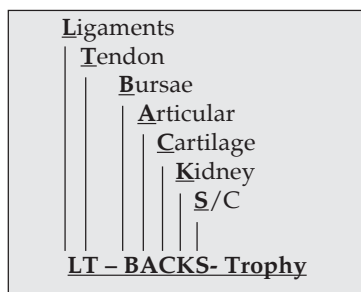
4. **MC malignant bone tumor:** (DNB 2011)
 A. Osteosarcoma B. Ewing's sarcoma
 C. Osteochondroma D. Metastasis
Ans. is 'D' Metastasis
 Metastases>multiple myeloma>osteosarcoma is order of bone malignancy
5. **Most common cause of tardy ulnar nerve palsy is:** (DNB 2011, 1996)
 A. Supracondylar fracture B. Fracture of lateral condyle
 C. Posterior elbow dislocation D. Olecranon fracture
Ans. is 'B' Fracture of lateral condyle
 Tardy ulnar nerve palsy is seen due to cubitus valgus most commonly and most common cause is non union lateral condyle fracture.
6. **Allen's test is for the patency of:** (DNB 2011)
 A. Radial and ulnar artery B. Subclavian artery
 C. Vertebral artery D. Internal carotid artery
Ans. is 'A' Radial and ulnar artery
7. **OA commonly affects: (DNB 2011)**
 A. MP joints B. DIP
 C. Ankle joint D. All of the above
Ans. is 'B' DIP
 MCP and ankle are usually not affected in OA
8. **Position in post dislocation hip:** (DNB 2011)
 A. Flexion, abduction, external rotation B. Flexion, adduction, external rotation
 C. Flexion, abduction, internal rotation D. Flexion, adduction, internal rotation
Ans. is 'C' Flexion, abduction, internal rotation
9. **Child comes with pronated forearm and X-ray is normal, diagnosis:** (DNB 2011)
 A. Supracondylar fracture B. Dislocation of elbow
 C. Pulled elbow D. Fracture lateral epicondyle
Ans. is 'C' Pulled elbow
 Pronated forearm in a child with normal xrays goes towards pulled elbow
10. **Klumpke's paralysis involves :** (DNB 2011)
 A. C₈ – T₁ B. C₅ – C₆
 C. L₅ – S₁ D. C₃ – C₄
Ans. is 'A' C₈ – T₁
 Erbs palsy involves C5-C6 and klumpkes palsy involves C8 and T1
11. **Most common site of osteoma in paranasal sinuses:** (DNB 2011)
 A. Maxillary B. Frontal
 C. Ethmoid D. Sphenoid
Ans. is 'B' Frontal
 Ivory Osteomas most commonly involve frontal sinus
12. **Distal interphalangeal joint involvement is seen in:** (DNB 2011)
 A. Osteoarthritis B. Rheumatoid arthritis
 C. Rheumatic fever D. Reiter's disease
Ans. is 'A' Osteoarthritis
 DIP is one of the most common involved joint in OA
13. **Osteoarthritis does not involve :** (DNB 2011)
 A. Hip B. Ankle
 C. Cervical spine D. Knees
Ans. is 'B; Ankle
 DIP is most commonly involved joint and knee and hip are also commonly involved. Ankle involvement is rare.

14. Most common malignant tumor of bone: (DNB 2011)
 A. Osteosarcoma B. Multiple myeloma
 C. Ewing's tumor D. Osteochondroma

Ans. is 'B' Multiple myeloma
 Metastases>multiple myeloma>osteosarcoma

15. Not a site of gouty tophi deposition: (DNB 2011)
 A. Shoulder B. Muscle
 C. Synovial membrane of knee D. Achilles tendon

Ans. is 'B' Muscle



16. Multiple loose bodies in knee with snow storm appearance : (DNB 2011)
 A. Rheumatoid arthritis B. Synovial chondromatosis
 C. SLE D. Reiter's syndrome

Ans. is 'B' Synovial chondromatosis

17. CRP is not increased in: (DNB 2011)
 A. Osteoarthritis B. Rheumatoid arthritis
 C. Rheumatic fever D. SLE

Ans. is 'A' Osteoarthritis

Non inflammatory arthritis like OA does not have elevation of ESR or CRP

18. Arthritis mutilans is seen in: (DNB 2011)
 A. SLE B. Psoriatic arthropathy
 C. Osteoarthritis D. Gout

Ans. is 'B' Psoriatic arthropathy

Arthritis Mutilans

A destructive arthritis of the hands and feet with resorption of bone ends and telescoping joints (main - en - lorgnette).

- | | |
|-------------------------------------|-------------------------------|
| 1. Rheumatoid arthritis | 2. Juvenile chronic arthritis |
| 3. Psoriatic arthropathy | 4. Diabetes |
| 5. Leprosy | 6. Neuropathic arthropathy |
| 7. Reiter's syndrome - in the feet. | |

19. ESR is not increased in: (DNB 2011)
 A. RA B. OA
 C. SLE D. Multiple myeloma

Ans. is 'B' OA

Non inflammatory arthritis like OA does not have elevation of ESR or CRP

20. Tension band wiring is used for: (DNB 2011)
 A. Ulna B. Patella
 C. Clavicle D. Radius

Ans. is 'B' Patella

Tension band wiring is for olecranon, patella and medial malleolus

21. **Bone tumor arising from epiphysis and recurs till epiphysis fuse:** (DNB 2011)
 A. Osteoclastoma B. Chondroblastoma
 C. Osteoid and stage D. Osteoblastoma

Ans. is 'A' Osteoclastoma

Osteoclastoma is after skeletal maturity and chondroblastoma is before skeletal maturity.

22. **Joint involved in Rheumatoid arthritis includes all except** (DNB December 2011)
 A. PIP B. DIP
 C. MCP D. Cervical spine

Ans. is 'B' DIP

DIP is not involved usually in case of rheumatoid arthritis.

14 Joints involved are Right and Left PIP, MCP, Wrist, Elbow, Knee, Ankle and MTP.

23. **Renal osteodystrophy skeletal abnormality is because of** (DNB 2011)
 A. impaired synthesis of D3 B. Hypocalcemia
 C. Hyperphosphatemia D. Loss of Vitamin D and calcium through dialysis

Ans. is 'C' Hyperphosphatemia

Hyperphosphatemia is the principal regulator of increased serum parathyroid hormone levels in CRF that in turn causes the skeletal manifestations of renal osteodystrophy.

24. **Klippel Feil syndrome includes all except** (DNB 2011)
 A. Bilateral neck webbing B. Bilateral SCM shortening
 C. Low hairline D. Restriction of neck movements

Ans. is 'B' Bilateral SCM shortening

Short webbed neck, low posterior hairline and restricted neck movements is triad of Klippel Feil Syndrome

25. **Characteristic subperiosteal bone resorption in Hyperparathyroidism is best seen at** (DNB 2011)
 A. Rib margins B. Medial margin of proximal humerus
 C. Radial border of middle phalanx D. Lamina dura

Ans. is 'C' Radial border of middle phalanx

Radial border of middle phalanx resorption is characteristic for hyperparathyroidism

Other features are Osteopenia, loss of lamina dura, Brown Tumor, Salt and pepper skull and basket weave appearance of cortex.

26. **Which is not a fibrous joint** (DNB 2011)
 A. Skull sutures B. 1st costochondral joint
 C. Tooth socket D. Inferior tibiofibular syndesmosis

Ans. is 'B' First costochondral joint

Classification of joints

(1) Synarthroses (bone-solid connective tissue - bone)

A. Fibrous joints

1. Sutures (Bone-Collagenous sutural ligament - Bone) e.g. Sutures of the skull
2. Syndesmoses (Bone-Collagenous enterosseous ligament, membrane or cord - Bone) e.g. Inferior tibiofibular joints
3. Gomphoses - (Bone- Complex collagenous peridontium - Dental cement) e.g. Tooth in its socket

B. Cartilaginous joints

1. Synchondrosis/Primary cartilaginous joints - (Bone Hyaline cartilage - Bone) e.g.
 - a. Joints between epiphysis and diaphysis of a growing long bone
 - b. First chondrosternal joint
 - c. Costochondral joints
 - d. Spheno-occipital joints
2. Symphysis/Secondary cartilaginous joints - (Bone-Hyaline cartilage - Fibrocartilaginous disc- Hyaline cartilage - Bone) Typically occur in the Median Plane of the body e.g.
 - a. Symphysis pubis
 - b. Manubriosternal joint
 - c. Intervertebral joints between vertebral bodies

Diarthroses – (Synovial joints)

Type of joint	Axis	Movements	Examples
Plane/Gliding joint	Uniaxial	Gliding	Intercarpal joints, Intertarsal joints, Between articular processes of vertebrae
Hinge joints	Uniaxial	Flexion, Extension	Elbow joints, Ankle joints, Interphalangeal joints
Pivot joints	Uniaxial	Rotation	Median atlantoaxial joint, Superior & inferior radioulnar joints
Condylar joints	Biaxial	Flexion, Extension, Limited rotation	Knee joints, Joints between condyles of mandible and temporal bone
Ellipsoid joints	Biaxial	Flexion, Extension, Abduction, Adduction, Circumduction	Wrist joint, Metacarpopharyngeal joint, Atlantoaxial joints (lateral)
Saddle joints	Multiaxial	Flexion, Extension, Abduction, Adduction, Conjoint rotation	Sternoclavicular joint, First carpometacarpal joint, Calcaneocuboid joint
Ball & Socket Joints	Multiaxial	Flexion, Extension, Abduction, Adduction, Circumduction, Rotation	Shoulder joint, Hip joint, Talocalcaneonavicular joint

27. **Cozen test is for** (DNB 2011)

- A. Golfers elbow
B. Tennis elbow
C. Little leaguers elbow
D. Frozen shoulder

Ans. is 'B' Tennis elbow

Cozen test is for tennis elbow (Lateral epicondylitis)
Golfers elbow – Medial epicondylitis
Frozen Shoulder – Adhesive capsulitis
Little leaguers elbow – avulsion of tip of medial epicondyle

28. **Potts spine is commonest at** (DNB 2010)

- A. Thoracolumbar
B. Sacral
C. Cervical
D. Lumbosacral

Ans. is 'A' Thoracolumbar region

29. **In Froment's sign – Which muscle is tested:** (DNB 2010, 09, 08, 07, 03, 1996)

- A. Adductor pollicis
B. Opponens pollicis brevis
C. Flexor pollicis brevis
D. Abductor pollicis

Ans. is 'A' Adductor pollicis

Book test is testing of adductor pollicis supplied by ulnar nerve and in adductor pollicis palsy Froment sign is seen.

30. **Fenestrated hip prosthesis is** (DNB 2010)

- A. Bipolar prosthesis
B. Austin Moore
C. Thompson prosthesis
D. All

Ans. is 'B' Austin Moore

Austin Moore and Thompson are unipolar prosthesis.

	Austin moore	Thompson
Parts	Head, Neck, Collar, Shoulder, Stem	Head, Neck, Collar, Stem (no shoulder)
Fixation	Without bone cement	With bone cement
Extraction	Easier	Very difficult
Stem fenestrations	Two in number	Nil
Used when	Calcar femorale > 1.25 cm	Calcar femorale < 1.25cm

31. **Thomas test is for (DNB 2010)**

- | | |
|------------------|-----------------|
| A. Hip flexion | B. Knee flexion |
| C. Hip abduction | D. Hip rotation |

Ans. is 'A' Hip flexion

32. **Charlie Chaplin gait is seen in (DNB 2010)**

- | | |
|-------------------------|-------------------|
| A. Congenital coxa vara | B. Tibial torsion |
| C. Genu valgus | D. DDH |

Ans. is 'B' Tibial torsion

Charlie chaplin gait is due to external tibial torsion

33. **Salmonella osteomyelitis is common in**

(DNB 2010)

- | | |
|------------------------|--------------|
| A. Sickle cell disease | B. HIV |
| C. IV drug abusers | D. Pregnancy |

Ans. is 'A' Sickle cell disease

34. **Intranasal calcitonin is most commonly used for**

(DNB 2010)

- | | |
|-------------------|------------------|
| A. Pagets disease | B. Osteoporosis |
| C. Hypercalcemia | D. Osteopetrosis |

Ans. is 'B' Osteoporosis

Most common indication amongst the mentioned is for osteoporosis

35. **Most common type of elbow dislocation is**

(DNB 2010)

- | | |
|------------------|-------------------|
| A. Posterior | B. Posterolateral |
| C. Posteromedial | D. Lateral |

Ans. is 'A' Posterior

36. **Indication for surgical compartment release in compartment syndrome in any compartment is absolute pressure greater than**

(DNB 2010)

- | | |
|-------------|-------------|
| A. 15 mm Hg | B. 20 mmHg |
| C. 30 mm Hg | D. 40 mm Hg |

Ans. is 'C' 30 mm Hg

The normal pressure is <11 mm Hg and pressure more than 30 mm Hg is taken as value for fasciotomy

37. **True about Slipped Capital Femoral Epiphysis is**

(DNB 2010)

- | | |
|------------------------------|---------------------------|
| A. Seen in thin children | B. Trethowan sign is seen |
| C. Major traumatic condition | D. Seen in adults |

Ans. is 'B' Trethowan sign is seen

SCFE is seen in adolescents, seen in obese overweight individuals and seen as a result of minor trauma. Trethowan sign is seen.

38. **Fracture of distal tibial epiphysis with anterolateral displacement is called as**

(DNB 2010)

- | | |
|------------|-------------|
| A. Potts | B. Tillaux |
| C. Cottons | D. Triplane |

Ans. is 'B' Tillaux

Tillaux fracture is seen in adolescent due to fusion of medial part of tibial physis but unfused anterolateral part causing its avulsion in ankle injuries

39. **Shepherd crook deformity is seen in**

(DNB 2010)

- | | |
|--------------------------|----------------------------|
| A. Fibrous dysplasia | B. Adamantinoma |
| C. Non ossifying fibroma | D. Fibrous cortical defect |

Ans. is 'A' Fibrous dysplasia

40. **Diastatic fractures involve**

(DNB 2010)

- | | |
|----------------|---------------|
| A. Skull bones | B. Long bones |
| C. Sternum | D. Ribs |

Ans. is 'A' Skull bones

- 41. Hill Sachs lesion involves** (DNB 2010)
 A. Posterolateral humerus
 B. Anterior part of humerus head
 C. Anteromedial part humerus head
 D. Glenoid labrum tear
 C. Axillary nerve
 D. Ulnar nerve
Ans. is 'A' Posterolateral humerus
- 42. Fracture shaft humerus nerve involved** (DNB 2010)
 A. Median nerve
 B. Radial nerve
 C. Axillary nerve
 D. Ulnar nerve
Ans. is 'B' Radial nerve
- 43. Meralgia paraesthetica involves** (DNB 2010)
 A. Lateral cutaneous nerve of thigh
 B. Forearm
 C. Radial nerve
 D. Obturator nerve
Ans. is 'A' Lateral cutaneous nerve of thigh
- 44. Marble bone disease is also known as** (DNB 2010)
 A. Osteoporosis
 B. Osteochondritis
 C. Osteopetrosis
 D. Osteogenesis imperfecta
Ans. is 'C' Osteopetrosis
- 45. Non traumatic amputation is seen in** (DNB 2010)
 A. Sickle cell disease
 B. Diabetes mellitus
 C. Leprosy
 D. All of the above
Ans. is 'D' All of the above
 Amputations are divided into Traumatic Amputations (those involving loss of a body part caused by an injury) and Non-traumatic Amputations. The later often occurs secondary to diabetes, poor circulation, or infection.
 Diabetes is the most common cause of non-traumatic amputation of the lower limb. This is primarily a result of peripheral neuropathy. 60% of non-traumatic lower-limb amputations occur among diabetics in the US
 Causes of non traumatic amputation
- Diabetes mellitus
 - Peripheral neuropathy
 - Leprosy
 - Acroosteolysis neurogenic
 - Compartment syndrome
 - Gangrene
 - Sensory neuropathy
 - Osteomyelitis
 - Sickle cell anemia
 - Peripheral vascular disease
 - Charcot-Marie-Tooth disease, Type 2B
 - Frostbite
 - Mycetoma
- 46. Siffert –katz sign is seen in** (DNB 2010)
 A. Perthes sign
 B. Blounts disease
 C. Osteogenesis imperfecta
 D. Pulled elbow
Ans. is 'B' Blounts disease
 In infantile form of Blount's disease varus deformity is usually accompanied by medial tibial torsion, a limp or waggling gait and posteromedial subluxation of knee when held in partial flexion (Siffert-katz sign)
- 47. Ewing's sarcoma is believed to arise from:** (DNB 2010)
 A. Aberrant cartilage rests
 B. Endothelial cells in the bone marrow
 C. Mesothelial cells
 D. Periosteocytes
Ans. is 'B' Endothelial
 Ewings arises from marrow
- 48. Osteochondritis known as Sever's disease involves:** (DNB 2010)
 A. Talus
 B. Lunate
 C. Tarsal navicular
 D. Calcaneus
Ans. is 'D' Calcaneus

49. **A small boy is brought to the emergency department by his parents if found to have a spiral fracture of the femur, with a variety of ecchymoses, Likely cause is:** (DNB 2010)
 A. Automobile hit and run accident B. Fall from a tree
 C. Child abuse D. Fall from a bicycle
Ans. is 'C' Child abuse
 Child with ecchymosis with spiral fractures is battered baby syndrome or child abuse.
50. **Regarding pseudo gout, wrong statements is :** (DNB 2010)
 A. It does not affect large joints B. It does not affect small joints
 C. Chondroclacinosi D. Deposition of calcium pyrophos tate
Ans. is 'A' It does not affect large joints
 Pseudogout most commonly involves knee, largest joint in body
51. **Normal bone remodelling in response to stress was described by: (DNB 2009)**
 A. Pauwels B. Kuntscar
 C. Wolff D. Hugh Owen Thomas
Ans. is 'C' Wolf
 Remodelling takes place according to wolffs law
52. **The following are true of multiple exostoses except:** (DNB 2009)
 A. Herediatriy transmission (Autosomal dominant) B. Presence of multiple exostoses
 C. Osteopenia D. Growth defects
Ans. is 'C' Osteopenia
 Osteopenia is not associtaed with osteochondroma. Hereditary transmission, growth defects are seen with multiple osteochondromas
53. **The commonest donor site for autologous bone graft is:** (DNB 2009)
 A. Fibula B. Rib
 C. Greater trochanter D. Iliac crest
Ans. is 'D' Iliac crest
 Iliac crest is most common donor site for bone grafting
54. **The following biological factors causing delayed union are true, except :** (DNB 2009)
 A. Inadequate blood supply B. Severe soft tissue damage
 C. Periosteal stripping D. None.
Ans. is 'D' None
 ALL the factors mentioned above cause delayed or non union
55. **The following sites are most commonly affected in a traumatic osteonecrosis, except :** (DNB 2009)
 A. The head of the femur B. The proximal part of scaphoid
 C. The posterior half of the talus D. The head of the radius.
Ans. is 'D' The head of the radius
 AVN is not known to involve radial head
56. **The most common cause for anterior knee pain:** (DNB 2009)
 A. Prepatellar bursitis B. Congenital discoid meniscus
 C. Plica syndrome D. Chondromalacia patellae
Ans. is 'D' Chondromalacia patellae
 Chondromalacia patellae is most common cause of anterior knee pain .Theatre sign is seen.
57. **The most common type of spondylolisthesis:** (DNB 2009, 10)
 A. Congenital dysplastic B. Isthmic spondylolytic
 C. Degenerative D. Traumatic
Ans. is 'B' Isthmic spondylolytic
 Spondylolistesis most commonly is isthmic type and involves L5 – S1

- 58. The following are associated with fibular hemimelia except :** (DNB 2009)
- | | |
|--|-----------------------------|
| A. Short tibia | B. Anterior bowing of legs |
| C. Equino valgus deformity of the foot and ankle | D. Presence of polydactyly. |

Ans. is 'D' Presence of polydactyly

There is hypoplasia or less development in fibular hemimelia causing failure to develop post axial part of the limb it has short tibia, equino valgus deformity and bowing of leg

- 59. De Quervain's disease classically affects the:** (DNB 2009)
- | | |
|--|---|
| A. Flexor pollicis longus and brevis | B. Extensor carpi radialis and extensor pollicis longus |
| C. Abductor pollicis longus and brevis | D. Extensor pollicis brevis and abductor pollicis longus. |

Ans. is 'D' Extensor pollicis brevis and abductor pollicis longus.

- 60. Heberden's nodes are found in:** (DNB 2009)
- | | |
|---------------------------------------|---------------------------------------|
| A. PIP joints in osteoarthritis | B. DIP joints in osteoarthritis |
| C. PIP joints in rheumatoid arthritis | D. DIP joints in rheumatoid arthritis |

Ans. is 'B' DIP joints in osteoarthritis

DIP involvement cause Heberdens nodes and PIP cause Bouchards nodes

- 61. Meralgia paresthetica is due to involvement of:** (DNB 2009)
- | | |
|------------------------------------|-------------------------------------|
| A. Medial cutaneous nerve of thigh | B. Lateral cutaneous nerve of thigh |
| C. Sural nerve | D. Femoral nerve |

Ans. is 'B' Lateral cutaneous nerve of thigh.

- 62. Bankart's lesion involves which of the following part of the glenoid labrum:** (DNB 2009)
- | | |
|------------------------|-------------------------|
| A. Anterior part | B. Superior part |
| C. Anterosuperior part | D. Antero inferior part |

Ans. is 'A' Anterior part

Bankarts lesion involves anterior part .

- 63. Which of the following tumors arise from epiphysis:** (DNB 2009)
- | | |
|------------------------|------------------------|
| A. Ewing's sarcoma | B. Osteoclastoma (GCT) |
| C. Chondroxoid fibroma | D. Osteosarcoma |

Ans. is 'B' Osteoclastoma (GCT)

Chondroblastoma and GCT are 2 important epiphyseal tumors

- 64. Bohler's angle is decreased in fracture of:** (DNB 2009)
- | | |
|--------------|-----------|
| A. Calcaneum | B. Talus |
| C. Navicular | D. Cuboid |

Ans. is 'A' Calcaneum

Bohlers angle and angle of Gissane is seen in calcaneum.

- 65. Most common site of osteosarcoma is:** (DNB 2009)
- | | |
|-------------------------|-----------------------|
| A. Upper end of femur | B. Lower end of femur |
| C. Lower end of humerus | D. Lower end of tibia |

Ans. is 'B' Lower end of femur

Osteosarcoma and GCT both involves lower end femur most commonly

- 66. Surgical staging of bone tumors is by:** (DNB 2009)
- | | |
|-------------|---------------|
| A. Edmonton | B. Manchester |
| C. Enneking | D. TNM |

Ans. is 'C' Enneking

Bone tumors staging is Enneking

67. **Kanavel's sign is seen in:** (DNB 2009)
 A. Tenosynovitis B. Trigger finger
 C. Dupuytren's contracture D. Carpal tunnel syndrome

Ans. is 'A' Tenosynovitis

Kanavels sign is seen in tenosynovitis they include flexion of finger, uniform swelling, pain on extension **and uniform percussion tenderness.**

68. **Best prognosis after nerve repair:** (DNB 2009)
 A. Radial B. Median
 C. Sciatic D. Ulnar

Ans. is 'A' Radial

Good nerve

69. **Velpeau bandage and sling and swathe splint are used in:** (DNB 2009)
 A. Shoulder dislocation B. Fracture scapula
 C. Acromioclavicular dislocation D. Fracture clavicle

Ans. is 'C' Acromioclavicular dislocation

70. **Watson Jones approach is done for:** (DNB 2009)
 A. Neglected club foot B. Muscle paralysis
 C. Valgus deformity D. Hip replacement

Ans. is 'D' Hip replacement

Watson Jones procedure is for ankle instability and approach is anterolateral approach to hip joint.

71. **Risser localiser cast is used in the management of:** (DNB 2009)
 A. Kyphosis B. Spondylolisthesis
 C. Idiopathic scoliosis D. Lordosis

Ans. is 'C' Idiopathic

Risers cast is used for idiopathic scoliosis

72. **Most common cause of insertional tendonitis of tendoachilles is:** (DNB 2009)
 A. Overuse B. Improper shoe wear
 C. Runners and jumpers D. Steroid injections

Ans. is 'A' Overuse

Most common cause of insertional tendonitis is overuse and of non insertional tendonitis is runners and jumpers.

73. **Tarsal tunnel syndrome is caused with which arthritis:** (DNB 2009)
 A. Ankylosing spondylitis B. Osteoarthritis
 C. Rheumatoid arthritis D. Psoriatic arthritis

Ans. is 'B' Osteoarthritis

Most common cause of Tarsal tunnel syndrome is idiopathic > O.A > R.A

74. **Osteosclerotic bone metastasis is found most commonly in which carcinoma:** (DNB 2009)
 A. Kidney B. Thyroid
 C. Lung D. Prostate

Ans. is 'D' Prostate

Osteoblastic secondaries are seen in prostate, carcinoid and medulloblastoma.

75. **Earliest site of bone involvement in hematogenous osteomyelitis:** (DNB 2009)
 A. Metaphysis B. Diaphysis
 C. Epiphysis D. Point of entry of the nutrient artery

Ans. is 'A' Metaphysis

Osteomyelitis is most commonly transmitted through hematogenous route and seeds in metaphysis.

76. **Posterior glenohumeral instability can be tested by:** (DNB 2009)
 A. Jerk test B. Crank test
 C. Fulcrum test D. Sulcus test

Ans. is 'A' Jerk test

Jerk test is for posterior glenohumeral instability and lift off test is for subscapularis tear.

77. **Kocher Langenbeck approach for emergency acetabular fixation is done in all except:** (DNB 2009)
 A. Open fracture B. Progressive sciatic nerve injury
 C. Recurrence dislocation inspite of closed reduction and traction D. None of the above

Ans. is 'D' None of the above

Emergency acetabular fixation is done for open fractures,vascular injury, joint instability and progressive nerve injury.

78. **About congenital torticollis all are true except:** (DNB 2009)
 A. Always associated with breech extraction B. Spontaneous resolution in most cases
 C. Two-third have palpable mass D. Uncorrected cases develop plagiocephaly

Ans. is 'A' Always associated with breech extraction

All the cases of torticollis are not associated with breech delivery

79. **TB Spine most commonly affects?** (DNB June 2009)
 A. Lumbar vertebra B. Cervical
 C. Thoracic D. Sacral

Ans. is 'C' Thoracic

Most common location of pott's spine is dorsal

80. **Avascular necrosis for patients can be retarded by?** (DNB June 2009)
 A. 500mg Ca daily B. 1000 mg Ca daily
 C. 1500 mg Ca daily D. 2000 mg Ca daily

Ans. is 'C' 1500 mg Ca daily

Adequate calcium intake is 1500 mg /day to decrease the chances of avascular necrosis

81. **The deformity of tibia in triple deformity of the knee is?** (DNB June 2009)
 A. Extension, Posterior subluxation & external rotation
 B. Flexion, Posterior subluxation & external rotation
 C. Flexion, Posterior subluxation & internal rotation
 D. Extension, Anterior subluxation & internal rotation

Ans. is 'B' Flexion, Posterior subluxation & external rotation

82. **Pseudoflexion deformity of hip is seen in?** (DNB June 2009)
 A. Iliopsoas abscess B. Tom smith arthritis
 C. Anterior dislocation of hip D. Central dislocation of hip

Ans. is 'A' Iliopsoas abscess

Pseudoflexion deformity rotations are free in position of deformity

83. **Vascular sign of narah is seen in?** (DNB June 2009)
 A. Posterior dislocation of hip B. Sub trochantric fracture of hip
 C. Anterior dislocation of hip D. Central dislocation of hip

Ans. is 'A' Posterior dislocation of hip

Vascular sign of narah is positive in case posterior dislocation due to absence of ground resistance to femoral artery pulsations in dislocated head

84. **Fracture shaft of humerus damages which nerve?** (DNB June 2009)
 A. Radial nerve B. Median nerve
 C. Axillary nerve D. Ulnar nerve

Ans. is 'A' Radial nerve

Radial nerve is involved in fracture humerus

85. **Gun stock deformity is seen in?** (DNB June 2009)
 A. Supracodylar fracture humerus B. Lateral condylar fracture of humerus
 C. Medial condylar fracture of humerus D. All of the above
- Ans. is 'A' Supracodylar fracture humerus**
 Cubitus varus or gun stock deformity most common cause is malunited supracondylar fracture humerus.
86. **Forced inversion in plantar flexed foot injuries?** (DNB June 2009)
 A. Talofibular ligament B. Deltoid ligament
 C. Medial collateral ligament D. All of the above
- Ans. is 'A' Talofibular ligament**
 Plantar flexion of ankle is weakest position of ankle and causes damage to lateral structures most commonly anterior talofibular ligament.
87. **Which is not true about CTEV shoe?** (DNB June 2009)
 A. Used only from the age the child starts walking B. Straight outer border
 C. No heel D. Raise outer portion
- Ans. is 'B' Straight outer border**
 CTEV shoes has straight inner border, outer shoe raise and no heel and is used after walking age .
88. **Jone's fracture is ?** (DNB June 2009)
 A. Avulsion fracture of base of fifth metatarsal B. Bimalleolar fracture of the ankle
 C. Burst fracture of 1st cervical vertebra D. Avulsion fracture of the medial femoral condyle
- Ans. is 'A' Avulsion fracture of base of fifth metatarsal**
89. **Adventitious bursa is:** (DNB 2008, 04, 1999, 1994)
 A. Normal B. Abnormal over friction site
 C. An infected defect D. A congenital cyst
- Ans. is 'B' Abnormal over friction cyst**
 Adventitious bursae are seen at the areas of friction due to overuse
90. **Which of the line of management for congenital pseudoarthrosis of Tibia:** (2008, 02)
 A. Amputation B. Charney implant
 C. Immobilization D. Vascularized fibular graft
- Ans. is 'D' Vascularized fibular graft**
 Congenital pseudoarthrosis of tibia the treatment option is fxation and bone grafting in cases of failure vascularised fibular graft is advised
91. **Linear striations are typically seen in:** (DNB 2008)
 A. Vertebral myeloma B. Vertebral lymphangiomas
 C. Vertebral metastasis D. Vertebral hemangiomas
- Ans. is 'D' Vertebral hemangiomas**
 Linear striations or corduroy appearance is characteristically seen in hemangiomas
92. **Most common medial meniscal tear is:** (DNB 2008)
 A. Longitudinal tear B. Oblique tear
 C. Radial tear D. Horizontal tear
- Ans. is 'A' Longitudinal tear**
 Most common medial meniscus tear is longitudinal tear
93. **Dupuytren's contracture most often involves** (DNB 2007, 06, 05, 01, 1999, 1995)
 A. Little finger B. Ring finger
 C. Thumb D. Any of the above
- Ans. is 'B' Ring finger**
 Dupuytren's contracture involves ring finger > little finger
 Most common joint involved is MCP > PIP > DIP

- 94. The commonest site of March fracture is:** (DNB 2007, 1995)
 A. Metatarsals B. Ankle
 C. Tibia D. Fibula
- Ans. is 'A' Metatarsals**
 Stress fracture is most common at 2nd metatarsal shaft >3rd metatarsal shaft
- 95. Most common cause of neuropathic joints is:** (DNB 2007, 05, 03, 01, 1999, 97)
 A. Leprosy B. Diabetes
 C. Rheumatoid arthritis D. Syphilis
- Ans. is 'B' Diabetes**
 Diabetes is most common cause of neuropathic joints causing involvement of midtarsal joints most commonly.
- 96. Radiosensitive tumors is:** (DNB 2007, 04, 01)
 A. Ewing's sarcoma B. Osteosarcoma
 C. Osteoclastoma D. Synovial sarcoma
- Ans. is 'A' Ewing's sarcoma**
 Ewings is highly radiosensitive tumor it melts like snow with radiotherapy even then preferred treatment places chemotherapy at the top.
- 97. Chemotherapeutic agents of choice for osteogenic sarcoma :** (DNB 2007, 02)
 A. Doxorubicin B. Methotrexate
 C. Cyclophosphamide D. 5-FU
- Ans. Is 'B' Methotrexate is most important for osteosarcoma.**
- 98. Card test detect the function of :** (DNB 2007)
 A. Median nerve B. Ulnar nerve
 C. Axillary nerve D. Radial nerve
- Ans. is 'B' Ulnar nerve**
 Card test is for ulnar nerve to test palmar interossei.
- 99. Sequestrum is a:** (DNB 2007)
 A. Infected bone B. New bone
 C. Dead bone D. Woven bone
- Ans. is 'C' Dead bone**
 Sequestrum is avascular piece of bone surrounded by granulation tissue it is pathognomic of chronic osteomyelitis
- 100. One of the following is a disease caused by osteoclast dysfunction:** (DNB 2007)
 A. Osteopetrosis B. Rickets
 C. Renal osteodystrophy D. Osteogenesis imperfect
- Ans. is 'A' Osteopetrosis**
 Pagets and osteopetrosis are 2 diseases due to osteoclast defect.
- 101. Fibrosis is commonest in:** (DNB 2007)
 A. Tendocalcaneus B. Sternocleidomastoid
 C. Trapezius D. Serratus anterior
- Ans. is 'B' Sternocleidomastoid**
 Congenital muscular torticollis or wry neck involves sternocleidomastoid and in it fibrosis is seen.
- 102. Which group of muscles is most commonly affected in poliomyelitis:** (DNB 2007)
 A. Dorsiflexion of the ankle B. Flexors of the knee
 C. Flexors of the hip D. Extensors of the hip
- Ans. is 'A' Dorsiflexion of the ankle**
 Most commonly affected muscle in lower limb is quadriceps>tibialis anterior.(ankle dorsiflexor)

103. **Myositis ossificans is commonly seen at the:** (DNB 2006, 03, 2K, 1994)
 A. Knee B. Elbow
 C. Shoulder D. Hip
Ans. is 'B' Elbow
 Most common location of myositis ossificans is elbow > Hip
104. **The complication of Colles, fracture is: (DNB 2006, 2K, 1995)**
 A. Stiffness of finger B. Ulnar nerve palsy
 C. Radial nerve palsy D. None of the above
Ans. is 'A' Stiffness of finger
 Most common complication for colles is finger stiffness>malunion
105. **Claw hand is seen in:** (DNB 2006, 04, 01, 1999, 1995)
 A. Ulnar nerve injury B. Carpal tunnel syndrome
 C. Multiple sclerosis D. Cervical rib
Ans. is 'A' Ulnar nerve injury
 Claw hand is seen in ulnar nerve injury, median nerve injury or combined nerve injury.
106. **Avascular necrosis of head of femur occurs commonly at:** (DNB 2006, 04, 03, 02, 1997)
 A. Subcapital region B. Transcervical region
 C. Subchondral region D. Trochanteric region
Ans. is 'A' Subcapital region
 Subcapital>transcervical>basiscervical is the order of involvement of Avascular necrosis in fracture neck femur
107. **The first sign of Volkmann's ischemia is:** (DNB 2006, 05, 02)
 A. Pain on passive movements B. Absence of arterial pulsation
 C. Development of contracture D. Pain out of proportion
Ans. is 'A' Pain on passive movements
 1st sign of volkmann's ischemia is pain on passive stretch at the distal most joint of the extremity
108. **A ten year old child sustained an elbow injury about four years ago. He now complains of deformity at the elbow and numbness of ulnar two fingers of the ipsilateral hand. Most probably the bony injury sustained was:** (DNB 2006)
 A. Supracondylar fracture of humerus B. Fracture of olecranon
 C. Fracture of lateral condyle of humerus D. Ulnar nerve injury
Ans. is 'C' Fracture of lateral condyle of humerus
 The case mentioned here is a case of tardy ulnar nerve palsy seen most commonly due to cubitus valgus due to lateral condyle fracture humerus.
109. **March fracture usually occurs in the:** (DNB 2006)
 A. 1st metatarsal B. 2nd metatarsal
 C. 4th metatarsal D. Head of the talus
Ans. is 'B' 2nd metatarsal
 March fracture involves 2nd metatarsal shaft > 3rd metatarsal shaft
110. **In congenital dislocation of hip, clinical sign which shows that the affected thigh is at a higher level when the knees and hips are flexed to 90 degrees is known as:** (DNB 2006)
 A. Ortolani's sign B. Barlow's sign
 C. Von Rossens sign D. Galeazzi's sign
Ans. is 'D' Galeazzi's sign
 Galeazzi sign or allis sign is done for DDH in which on hip flexion and knee flexion the knee on affected side is at lower levels.
111. **Trigger finger is:** (DNB 2005, 04, 02, 1998)
 A. Injury to fingers while operating a gun

- B. Stenosis tenovaginitis of flexor tendon of affected finger
- C. A feature of carpal tunnel syndrome
- D. Any of the above.

Ans. is 'B' Stenosis tenovaginitis of flexor tendon of affected finger

Trigger finger is stenosing tenosynovitis of flexor tendon with constriction at A1 pulley and nodule at MCP

112. Which of the following arises in the medullary canal: (DNB 2005, 01)

- A. Osteosarcoma
- B. Ewing's sarcoma
- C. Synovial sarcoma
- D. Osteoclastoma

Ans. is 'B' Ewing's sarcoma

Ewing's sarcoma arises from the marrow

113. Froment's sign is diagnostic of the following nerve injury: (DNB 2005)

- A. Median
- B. Ulnar
- C. Radial
- D. Musculocutaneous

Ans. is 'B' Ulnar

Froment sign is seen in ulnar nerve palsy other test for ulnar nerve palsy are Igawa test, Wartenberg's test and Card test.

114. Cubitus varus is the commonest complication of: (DNB 2005)

- A. Supracondylar fracture of humerus
- B. Fracture of olecranon
- C. Fracture head of radius
- D. Posterior dislocation of elbow

Ans. is 'A' Supracondylar fracture of humerus

Cubitus varus is most commonly due to malunited supracondylar fracture humerus

115. Commonly performed procedure of triple arthrodesis of foot includes fusion of the: (DNB 2005)

- A. Tibio-talar, talocalcaneal and talonavicular joints
- B. Talocalcaneal, talonavicular and calcaneocuboid joints
- C. Talonavicular, calcaneocuboid and ankle joints
- D. Ankle, subtalar and midtarsal joints

Ans. is 'B' Talocalcaneal, talonavicular and calcaneocuboid joints

Triple arthrodesis is done in CTEV after 10 years of age and involves fusion of talonavicular, talocalcaneal and calcaneocuboid joints.

116. Bone growth is influenced maximum by: (DNB 2004, 1996)

- A. Thyroxine
- B. Growth hormone
- C. Parathormone
- D. Estrogen

Ans. is 'B' Growth hormone

Maximum growth of bone is regulated by growth hormone

117. When the L₄ – L₅ intervertebral disc prolapses, the nerve root that is usually compressed is: (DNB 2004)

- A. L₄
- B. L₅
- C. S₁
- D. S₂

Ans. is 'B' L5

Most common disc prolapse is L4-L5>L5-S1 and most common type is paracentral causing compression of lower nerve root.

118. The ideal treatment of a 3 day old fracture neck of femur in a 50 year old male would be: (DNB 2004)

- A. Compression screw fixation
- B. POP hip spica
- C. Hemi replacement arthroplasty
- D. Total hip replacement

Ans. is 'A' Compression screw fixation

Age <65 <3 weeks fracture is treated by reduction + screw fixation

>3 weeks fracture-fixation +bone grafting or osteotomy

>65 years – hemiarthroplasty and any age arthritis Total hip replacement is advised.

119. Abduction and external rotation deformity at the hip may be seen in all of the following conditions except: (DNB 2004)

- | | |
|-----------------|---------------------------|
| A. Tuberculosis | B. Posterior dislocation |
| B. Polimyelitis | D. Fracture neck of femur |

Ans. is 'B' Posterior dislocation

Posterior dislocation causes FADIR that is flexion ,adduction and internal rotation.

120. A compartment syndrome in a leg can result from all of the following except. (DNB 2004)

- | | |
|-------------------------------------|---|
| A. Edema of muscles due to injury | B. Fracture hematoma within the compartment |
| C. Edema of muscles due to ischemia | D. Compound fracture |

Ans. is 'D' Compound fracture

Compartment syndrome is rare in open fracture rest all the mentioned conditions it is possible.

121. Commonest site for acute osteomyelitis is: (DNB 2003, 1999, 1994)

- | | |
|--------------|-----------|
| A. Hip joint | B. Tibia |
| C. Femur | D. Radial |

Ans. is 'C' Femur

Most common cause of acute osteomyelitis si staphylococcus aureus infection through hematogenous route and most common location is lower end femur.

122. Which of the following is not useful in the treatment of osteoporosis: (DNB 2003, 1992)

- | | |
|--------------|-------------------|
| A. Vitamin C | B. Vitamin D |
| C. Calcium | D. BiPhosphonates |

Ans. is 'A' Vitamin C

Drug used in osteoporosis

1. *Inhibit resorption:* Bisphosphonates, Denosumab, calcitonin, estrogen, SERMS, gallium nitrate.
2. *Stimulate formation:* Teriparatide(PTH analogue), calcium, calcitriol, fluorides.
3. *Both actions:* Strontium Ranelate.

123. Looser's zone is characteristic of: (DNB 2003, 1992)

- | | |
|------------------------|--------------------|
| A. Scurvy | B. Osteomalacia |
| C. Hyperparathyroidism | D. Paget's disease |

Ans. is 'B' Osteomalacia

Loosers zones are characteristic for osteomalacia or any bone softening disorder and most common site is femur neck

124. Which of the following nerve injuries producing the deformities is incorrect –(DNB 2003, 1993)

- | | |
|-------------------|--------------------|
| A. Upper trunk | Porter's tip hand, |
| B. Ulnar nerve | Claw hand, |
| C. Axillary nerve | wrist drop |
| D. Radial nerve | Wrist drop. |

Ans. is 'D' Axillary nerve – wrist drop

Axillary nerve palsy causes shoulder flattening and wrist drop is seen in radial nerve palsy.

125. Lachman sign is positive in (DNB 2003, 1993)

- | | |
|--------------------------------------|---------------------------------------|
| A. Anterior cruciate ligament injury | B. Posterior cruciate ligament injury |
| C. Medial meniscus injury | D. Lateral meniscus injury |

Ans. is 'A' Anterior cruciate ligament injury

Lachman test is most sensitive and specific test for acute or chronic injuries of ACL

126. Sun-ray appearance is seen in: (DNB 2003, 1998, 1993)

- | | |
|-------------------|------------------|
| A. Osteosarcoma | B. Osteoclastoma |
| C. Osteochondroma | D. Ewing's tumor |

Ans. is 'A' Osteosarcoma

No periosteal reaction is specific for any tumor but sun ray appearance is most commonly seen with osteosarcoma

- 127. Which nerve is closely related shoulder joint capsule:** (DNB 2002)
 A. Axillary nerve B. Radial nerve
 C. Median nerve D. Musculocutaneous nerve
- Ans. Is 'A' Axillary nerve is closely related to shoulder and is the most common nerve involved in anterior or inferior dislocation of shoulder.**
- 128. The attitude of lower-limb in case of posterior dislocation of hip is:** (2002)
 A. Flexion, adduction, internal rotation B. Extension, abduction, external rotation
 C. Flexion, abduction, internal rotation D. Extension, adduction, internal rotation
- Ans. Is 'A' Flexion, adduction, internal rotation**
 Posterior dislocation attitude is FADIR-Flexion, adduction and internal rotation and anterior dislocation is Faber-Flexion, abduction and external rotation.
- 129. Which of the following is first to ossify in foetal life: (DNB 2001, 1999, 96)**
 A. Vertebra B. Rib
 C. Skull D. None of the above
- Ans. is 'D' None of the above**
 Clavicle is the first bone to ossify in body
- 130. Mallet finger is avulsion of:** (DNB 2000, 1995)
 A. Terminal slip of extensor tendon to distal phalanx
 B. Terminal slip of flexor tendon to distal phalanx
 C. Terminal slip of flexor tendon to proximal phalanx
 D. Terminal slip of extensor tendon to proximal phalanx
- Ans. is 'A' Terminal slip of extensor tendon to distal phalanx**
 Avulsion of extensor tendon from distal phalanx is mallet finger
- 131. Volkmann's ischemia most commonly involves:** (DNB 2000, 1996)
 A. Pronator teres B. Flexor carpi radialis longus
 C. Flexor digitorum profundus D. Flexor digitorum superficialis
- Ans. is 'C' Flexor digitorum profundus**
 Most common muscle involved is Flexor digitorum profundus > Flexor pollicis longus
- 132. Treatment of club foot should begin:** (DNB 2000, 1997)
 A. As soon as possible after birth B. 1 month after birth
 C. 1 year after birth D. None of the above
- Ans. is 'A' As soon as possible after birth**
 Ponsetti method is the one followed world wide now and its principles are manipulation and cast at birth and weekly change of cast.
- 133. Commonest cause of Compartment syndrome is: (DNB 2000, 1998)**
 A. Fractures B. Gas gangrene
 C. Superficial injury to muscles D. Operative trauma
- Ans. is 'A' Fracture**
 Commonest cause of compartment syndrome is fracture.
- 134. Monteggia fracture is fracture of:** (DNB 1999, 97)
 A. Upper 1/3rd of ulna B. Lower 1/3rd of ulna
 C. Upper 1/3rd of radius D. Lower 1/3rd of radius
- Ans. is 'A' Upper 1/3rd of Ulna**
 Monteggia fracture is fracture of upper 1/3rd ulna with dislocation of radial head
- 133. Match the following: (DNB 1999, 1998)**
 (I) Erb's paralysis (i) Lower trunk injury
 (II) Klumpke's paralysis (ii) Axillary nerve injury
 (III) Crutch paralysis (iii) Radial nerve injury

(IV) Fracture surgical neck – (iv) Upper trunk injury

- A. I (iv) II (iii) III (ii) IV (i)
 B. I (iii) II (ii) III (iv) IV (i)
 C. I (iv) II (i) III (iii) IV (ii)
 D. I (i) II (iii) III (iv) IV (ii)

Ans. is 'C' I (iv) II (i) III (iii) IV (ii)

Erbs palsy involves upper trunk

Klumpkes palsy involves lower trunk

Crutch palsy involves radial nerve

Fracture surgical neck involves axillary nerve

135. Commonest benign bone tumour is:

(DNB 1999, 1998)

- A. Bone cyst
 B. Blastoma
 C. Chordoma
 D. Osteoma

Ans. is 'D' Osteoma

Osteoid osteoma is the most common true benign bone tumor

136. Von Rosen splint is used in the treatment of:

(DNB 1998)

- A. Club foot
 B. Congenital coxa vara
 C. Congenital dislocation
 D. Legg-Calve-Perthes disease

Ans. is 'C' Congenital dislocation

Von rosen splint is used for DDH

Dennis brown splint is used for CTEV

Petries cast is used for Perthes disease

137. Deformity in hammer toe is flexion at:

(DNB 1998)

- A. DIP
 B. PIP
 C. Metatarsophalangeal
 D. Calcaneonavicular

Ans. is 'B' PIP

Deformity in hammer toe is flexion at DIP and in claw toe is hypertextension at MCP and flexion at PIP and DIP.

138. Compound palmar ganglion is

(DNB 1998)

- A. Tuberculosis affection of ulnar bursa
 B. Pyogenic affection of ulnar bursa
 C. Non-specific affection of ulnar bursa
 D. Ulnar bursitis due to compound

Ans. is 'A' Tuberculosis affection of ulnar bursa

Compound palmar ganglion is tubercular infection of ulnar bursa

139. Paraplegia due to T.B. spine most commonly occurs at:

(DNB 1997)

- A. Cervical spine
 B. Upper thoracic spine
 C. Lower thoracic spine
 D. Lumbar spine

Ans. is 'B' Upper thoracic spine

Paraplegia is most commonly seen at upper dorsal spine because of narrow space in central canal at this space causing compromise of neural structures.

140. The nerve most commonly involved in fracture of surgical neck of humerus:

(DNB 1997)

- A. Axillary nerve
 B. Median nerve
 C. Radial nerve
 D. Ulna nerve

Ans. is 'A' Axillary nerve

Nerve most commonly involved in fractures of surgical neck humerus is axillary nerve.

- 141. In a newborn child, abduction and internal rotation produces a click sound. It is:** (DNB 1997)
 A. Otorolani's sign B. Telescoping sign
 C. Mc Murray's sign D. Lachman's sign
- Ans. is 'A' Otorolani's sign**
 ORtolani is test of reduction of hip by abduction of hip
 Barlows is test of dislocation of hip by adduction
- 142. Most common cause of kyphosis in a male in India is** (DNB 1997)
 A. Congenital B. TB.
 C. Trauma D. Secondaries
- Ans. is 'B' T.B.**
 Most common cause of kyphosis in males is Tuberculosis and in females is osteoporosis
- 143. Which of the following enzymes differentiates osteoclast from osteoblast:** (DNB 1996)
 A. Alkaline phosphatase B. Acid phosphatase
 C. Deoxyribonuclease D. None of the above
- Ans. is 'B' Acid phosphatase**
 Osteoclast has acid phosphatase that differentiates it from osteoblast
- 144. Epiphyseal dysgenesis is seen in:** (DNB 1996)
 A. Rhuematoid arthritis B. Still's disease
 C. Down's syndrome D. Hypothyroidism
- Ans. is 'D' Hypothyroidism**
 Epiphyseal enlargement is seen in Juvenile rheumatoid arthritis
 And epiphyseal dysgenesis is seen in hypothyroidism.
- 145. The most common cause of osteomyelitis are :** (DNB 1995)
 A. Staphylococci B. Streptococci
 C. H. Influenzae D. Gonococci
- Ans. is 'A' Staphylococci**
 The most common organism causing osteomyelitis is staphylococci
- 146. Match Following** (DNB 1995)
 I. Ewing's tumour (i) Flat bones,
 II. Chondrosarcoma (ii) Diaphysis
 III. Osteosarcoma (iv) Epiphysis
 IV. Giant cell tumour (iii) Metaphysis
 A. I (i) II (ii) III (iii) IV (iv) B. I (ii) II (i) III (iii) IV (iv)
 C. I (ii) II (i) III (iv) IV (iii) D. I (ii) II (iii) III (iv) IV (i)
- Ans. is 'C' I (ii) II (i) III (iv) IV (iii)**
 Ewings and multiple myeloma are diaphyseal tumor
 GCT and Chondroblastoma are epiphyseal
 Osteosarcoma and ABC are metaphyseal
 Chondrosarcoma involves flat bones
- 147. The compression fracture is commonest in :** (DNB 1994)
 A. Cervical B. Upper thoracic
 C. Thoracolumbar D. Lumbosacral
- Ans. is 'C' Thoracolumbar**
 Compression fractures are most common at dorsolumbar junction lower dorsal > upper lumbar
- 148. The fracture of tibia in adults heals in :** (DNB 1994)
 A. 4 weeks B. 6 weeks
 C. 12 weeks D. 20 weeks
- Ans. is 'C' 12 weeks**
 Apleys rule of union is 3 weeks for upper limbs and six weeks for lower limb fracture in children and in adults this time is double. so adult tibial fracture will unite in about 12 weeks

149. Find incorrect match

(DNB 1994)

- | | |
|------------------------|---|
| A. Hyperparathyroidism | Subperiosteal erosion of phalanges |
| B. Rickets | Triradiate pelvis |
| C. Osteosarcoma | Multiple calcified secondaries in brain are commonest |
| D. Osteoclastoma | Soap-bubble appearance |

Ans. is 'C' Osteosarcoma- Multiple calcified secondaries in brain are commonest

Triradiate pelvis is a feature of Osteomalacia but can be seen in rickets and calcified mets in osteosarcoma are rare in brain they are most commonly in lungs

150. Medial epicondyle fracture results in injury to _____ nerve

(DNB 1993)

- | | |
|-----------|-------------|
| A. Radial | B. Median |
| C. Ulnar | D. Axillary |

Ans. is 'C' Ulnar

Ulnar nerve is related to medial epicondyle hence it is involved in these fracture

151. Calcaneus lengthening is done in

(DNB 1993)

- | | |
|----------------------|---------------------|
| A. Equinus deformity | B. Cuboid deformity |
| C. Flat deformity | D. Foot Drop |

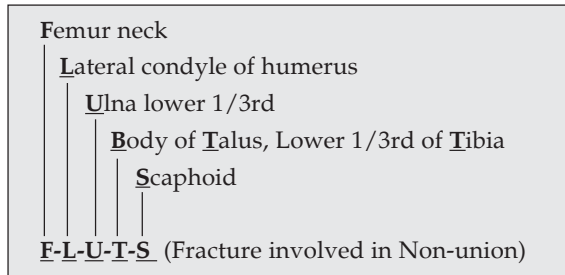
Ans. is 'A' Equinus deformity

Equinus deformity has tightening of tendoachilles and its lengthening is carried out in equinus deformity in cerebral alsy and polio.

152. Non-union is common in fracture of (DNB 1993)

- | | |
|--------------------------|---------------------|
| A. Lower tibia | B. Ulna |
| C. Supracondylar humerus | D. Coracoid process |

Ans. is 'A' Lower tibia



153. Find the incorrect answer from the choice given for question below:

(DNB 1992)

- Smith Peterson nail is used for Neck femur,
- Kutschner's nail is used for Shaft femur
- Nail is used for Tibial shaft.
- Rush nail is used for Shaft ulna

Ans. is 'A' Smith Peterson nail is used for neck femur

Smith peterson nail was usd for fracture neck femur earlier but is not used now due to poor results it was never a treatment option for subtrochanteric fracture femur.

Subtrochanteric fractures are treated by BLADE PLATE or cephallomedullary nails.



FOR THE STUDENTS BY THE STUDENTS

CHAPTER

4

1. IMAGING FOR ORTHOPAEDICS



QUESTIONS FROM STUDENTS IN CHANDIGARH!, NAGPUR!, INDORE!

1. **Best diagnostic test for calcification of ligaments MRI or CT ?**

Ans. Calcification of any tissue in body CT Scan is the investigation of choice.

Remember C for CT scan C for Cortex and C for Calcification. M for MRI, M for Marrow. MRI is also the best radiological investigation for soft tissues and cartilage.

2. **Investigation of choice in Perthes?**

- A. Xray
- B. USG
- C. CT
- D. MRI

Ans. MRI as it can identify Avascular necrosis of femoral epiphysis. Reduced intensity at the affected site and destruction of cartilage both can be identified on MRI.

Remember that there are two important images in MR_{T₁} and T₂.

T₁ - 1st professional subject anatomy –so in T₁ image anatomy seen

T₂ - 2nd professional subject pathology – so in T₂ image Pathology seen

‘Water is white on T₂’

Water is any body fluid example, synovial fluid/C.S.F/ inflammatory or traumatic edema.

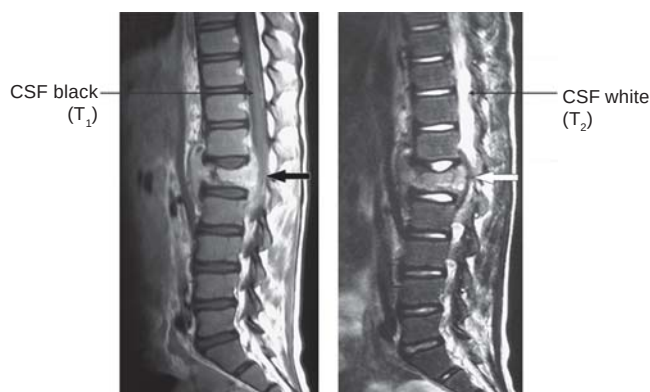


Fig. 1.1: MRI of Spine (T1 and T2 images)

3. **Stress fracture, investigation of choice:**

- A. Xray
- B. CT
- C. MRI
- D. Bone scan

Ans. Classical teaching is fracture is breach in cortex. But in cases of stress fracture there is marrow compression which is appreciated much early than a cortical breach and for marrow MRI is the investigation remembered as M for MRI, M for Marrow. Bilateral stress fracture Bone Scan is preferred as it can identify multiple sites in one investigation and the uptake in Bone Scan is dependant on osteoblastic activity. **Remember** B for Bone Scan, B for Blastic (Osteoblastic activity).

Thus stress fracture – if Unilateral than MRI is done, for bilateral Bone scan is done and if not mentioned anything than MRI is the best.

4. **Sir A young girl presented with history of trauma 2 months back, now she presents with swelling at mid shaft of femur and low grade fever. ESR is mildly raised. x-ray shows a lamellated periosteal reaction. next line of investigation:**

- | | |
|--------------|-----------|
| A. MRI | B. Biopsy |
| C. Bone scan | D. Blood |

Ans. This is clinical presentation of some chronic or aggressive lesion of femur the probabilities are Ewings Sarcoma or chronic osteomyelitis as both can have same presentation (Please remember most common presentation of Ewings is pain, swelling and fever which are same as infection or osteomyelitis) and periosteal reaction (Lamellated reaction or Onion peel reaction is seen in both malignant bone tumors like Ewings and Chronic osteomyelitis), thus the next investigation will be MRI to look at the extent of lesion, its soft tissue component. Further we need to obtain the tissue for confirmation of diagnosis (culture for infection and histopathology for tumors) and in this regards MRI can help us localize the margin of lesion for localizing the site of biopsy on the basis of last extent of marrow edema.

Please also remember biopsy is always taken from the margin of the lesion as centre of lesion has necrosis and biopsy from centre will have dead cells only and secondly from margin you can also take normal tissue to compare the affected tissue.

5. **For multiple Metastasis Bone scan or PET CT**

Ans. PET-CT better than Bone Scan as it localizes the tumor cells directly by Deoxyglucose as compared to bone scan where uptake of Methylene Diphosphate is by osteoblasts. Also PET-CT is able to identify the unknown primary by carrying out CT of whole body.

6. **Sir please tell more about bilateral periosteal reactions**

Ans. Causes of bilaterally symmetrical periosteal reaction in adults

- | | |
|---|---------------------------|
| 1. Hypertrophic Osteoarthropathy | 2. Pachydermoperiostosis |
| 3. Thyroid Acropachy | 4. Vascular Insufficiency |
| 5. DISH-Disseminated Interskeletal hyperostosis | 6. Fluorosis |

In children

- | | |
|----------------------------------|------------------------|
| 1. Normal infants upto 4 mths | 2. Rickets |
| 3. Scurvy | 4. Congenital syphilis |
| 5. Caffey's disease | 6. Acute leukemia |
| 7. Juvenile idiopathic arthritis | |

7. **Sir what is super scan on BONE SCAN and what are non-neoplastic causes of uptake on bone scan.**

Ans. Superscan is a diffuse symmetric uptake of radiopharmaceutical in the skeletal system. Causes of superscan:

- | | |
|--|---------------------------------|
| 1. Metastatic disease (most common) | |
| 2. Metabolic disease like renal osteodystrophy, hyperthyroidism and osteomalacia | |
| 3. Paget's disease | 4. Myeloproliferative disorders |

Non neoplastic causes of uptake on bone scan

- | | |
|---|--|
| 1. Infection | 2. Trauma |
| 3. Reflex Sympathetic Dystrophy | 4. Paget's disease and fibrous dysplasia |
| 5. Multiple Myeloma is cold on bone scan because of absence of osteoblastic activity but with fracture due to osteoblast may show activity. | |

8. **Sir what are other sequences on MRI apart from T₁ and T₂ images?**

Ans. A. An short tau Inversion Recovery (STIR): Fat looks white on both T₁ and T₂ images so may cause difficulty in identification of pathological lesion. Thus, fat suppression technique results in decreased signal from fat and increased signal from fluid and edema therefore this is an extremely sensitive tool for detection of soft tissue and marrow pathology.

B. Diffusion Weighted Imaging (DWI) is useful in diagnosis of bone and soft tissue tumors. In benign disease, no restriction of diffusion is seen, in malignant disease, restricted diffusion is seen.

9. **Sir we don't use ultrasound in orthopaedics?**

Ans. Now a days there is increasing role of USG in assessment of various joint and soft tissue pathologies.

- High frequency transducers are used (5-12 Mhz).
- It provides the benefit of real time imaging and evaluation of soft tissue near a metallic orthopedic hardware without the artifact that limits MR imaging.
- USG is specially useful in evaluation of muscles and tendons.
- Due to subjective variations in Ultrasound results, MRI has replaced its use for many indications.

4



-
- ```

graph TD
 Xray[X-ray] --- MRI[MRI]
 MRI --- Aspiration[Aspiration]
 Aspiration --- Swelling[Swelling of a joint]
 Xray --- MRI
 Aspiration --- Swelling
 Xray --- Swelling

```
- X-ray
- MRI
- Aspiration
- Swelling of a joint
- X-MAS



## QUESTIONS FROM STUDENTS IN LUCKNOW! AGRA!

- Ans.** Difference between Septic Arthritis and Transient Synovitis (Both have flexion abduction and external rotation at hip)

|              | Transient Synovitis  | Septic Arthritis     |
|--------------|----------------------|----------------------|
| 1. Symptoms  | Mild                 | Severe (Toxic child) |
| 2. Movements | Mild Reduction       | Absent               |
| 3. Age       | 6-12 years           | 0-5 years            |
| 4. ESR       | (n) to mild Increase | Markedly increased   |
| 5. WBC       | (n) to mild Increase | Markedly increased   |

2. Sir so many organisms to remember in osteomyelitis or septic arthritis what to do ?

- i. Sick Cell Anemia – Salmonella
- ii. I/V Drug abusers – Pseudomonas

- Ans.** Actually none of them, culture is best for any infection. MRI is the best radiological investigation for Marrow Edema in metaphysis and bone scan is second best.

- Ans.** Sequestrum or dead bone in presence of infected granulation tissue.

5. Sir what is the most common cause of bony Ankylosis septic or tuberculosis

1. *Peripheral joints*: Bony ankylosis. Septic arthritis commonest case
2. *Peripheral joints*: Fibrous ankylosis– Tuberculosis is commonest cause
3. *Spine*: Bony ankylosis-Tuberculosis commonest cause.

### 3. TUBERCULOSIS OF BONE AND JOINTS

1. A 30 years old HIV patient on anti retroviral therapy complains pain in right hip since 2 months he has deformity of flexion, abduction and External Rotation. Most likely diagnosis:

A. septic arthritis  
B. OA  
C. Avascular necrosis  
D. TB Hip

Ans. is 'D' TB Hip

|               | T B Hip in HIV                                                                                           | AVN Hip in HIV                                                                                                                                                                                       |
|---------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incidence     | More Common                                                                                              | Less Common                                                                                                                                                                                          |
| Deformity     | FABER-stage of synovitis may be prolonged on treatment than subsequently with onset of arthritis – FADIR | Limitation of abduction and internal rotation so initially position is adduction and external rotation (opposite to movements limited) and then subsequently with onset of arthritis FADIR develops. |
| Side affected | Unilateral usually                                                                                       | Bilateral usually can be unilateral                                                                                                                                                                  |

**FABER:** Flexion + Abduction + External rotation.

**FADIR:** Flexion + Abduction + Internal rotation.



#### QUESTIONS FROM STUDENTS IN AURANGABAD! JODHPUR! ALWAR!

1. Sir triple deformity of knee is seen in?

A. TB  
B. Septic arthritis  
C. Trauma  
D. RA

Ans. It can be remembered by a pneumonic TRIPLE.

Tuberculosis (most common cause)  
|  
Rheumatoid arthritis  
|  
Iliotibial band contracture  
|  
Polio  
|  
Low clotting power  
|  
Excess bleeding (hemophilia)  
|  
TRIPLE

2. Sir, what is the earliest change on X-ray in Potts Spine?

Ans. Earliest change in case of Potts Spine is Loss of curvature of spine and after that is reduced disc space.

3. Sir T.B. Spine affects what area most commonly?

Ans. T.B. spine affects Dorsolumbar region (i.e. Dorsal + Lumbar spine) in about 70% cases and dorsolumbar junction in about 10-15% cases.

4. Sir for T.B. Spine what is better for diagnosis MRI or CT guided biopsy?

Ans. Always remember growth of organism is most valuable for diagnosis of infection or T.B. hence CT guided biopsy is better.

5. Sir what is order of involvement of neural structures in Potts Spine?

Ans. Motor than Sensory than Urinary (MSU)

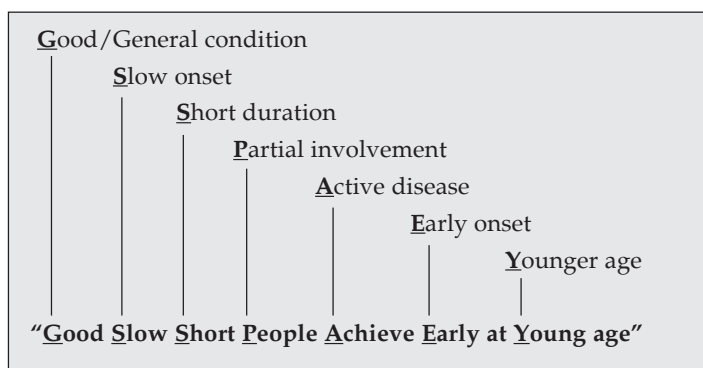
6. Sir Tuberculosis of the spine commonly affects all of the following parts of the vertebra except:

- A. Body B. Lamina  
C. Spinous process D. Pedicle

Ans. The paradiscal type is most common > central type (central part of vertebral body) > anterior type (anterior surface of vertebral body) > appendiceal type (involving pedicle, lamina, and less commonly transverse process, 2<sup>nd</sup> least common is spinous process and rarest variety is synovitis of facet joints).

7. Sir never able to remember the prognostic factors in tuberculosis of spine any way:

Ans. Okay let me give you a mnemonic. Good prognostic factors are:



#### QUESTIONS FROM STUDENTS IN AJMER! PUNE! DELHI!

1. Sir what is the difference between slow onset and early onset

Ans. Slow onset/acute onset refers to **speed of involvement** of neural structures in potts spine and early or late onset is for **duration of disease**.

Early onset is less than 2 years involvement and late onset is more than 2 years involvement.

2. Sir when do we operate in potts spine

Ans. In any disease of spine Disc prolapse, Trauma, Tumor or Tuberculosis the indications of surgery are the same:

- Bowel bladder involvement
- No improvement on conservative treatment
- Worsening on conservative treatment.

## 4. ORTHOPAEDICS ONCOLOGY



#### QUESTIONS FROM STUDENTS IN MUMBAI! MEERUT!

1. Sir Most Common Bone tumour?

Ans. Tumor like Fibrous Cortical Defect (Non ossifying fibroma) > Osteochondroma

2. MC true benign Bone tumour-osteoid osteoma?

Ans. Yes

3. MC tumour of jaw-SCC?

Ans. Yes

4. MC tumour of mandible

Ans. Squamous cell carcinoma.

Jaw or mandible both Squamous cell carcinoma.

Amelo blastoma – Most common site mandible

Amelo blastoma of long bones – called Adamantinoma and is most common in tibial diaphysis.

5. MC primary malignant bone tumour-multiple myeloma?

Ans. Yes

6. MC malignant bone tumour-osteosarcoma or metastasis?

Ans. Metastasis

7. Sir most common primary for bone metastases

Ans. Breast > Prostate

8. Sir a classical expansile lytic lesion in the transverse process of a vertebra is seen in:

A. Osteosarcoma

B. Aneurysmal bone cyst

C. Osteoblastoma

D. Metastasis

Ans. Posterior part of vertebra-pedicles lamina or transverse process

Expansile and Purely lytic – Aneurysmal Bone Cyst

Non expansile and partly or extensively ossified – Osteoblastoma

Vertebral bodies – GCT



QUESTIONS FROM STUDENTS IN KOLKATA! CHENNAI! CHANDIGARH

1. Sir tissue most sensitive to radiation.

A. Diaphysis

B. Epiphysis

C. Metaphysis

D. Cartilage.

Ans. Growing cartilage physis is most sensitive part of bone.

2. Sir what are the components of active benign tumour: enneking

Ans. Enneking's Classification System for bone tumors-Benign Tumor

- **Stage 1. LATENT:** Lesions are intracapsular, usually asymptomatic, and frequently incidental findings. An example is a small asymptomatic nonossifying fibroma discovered incidentally on radiographs taken to evaluate an unrelated injury.
- **Stage 2. ACTIVE:** Lesions also are intracapsular, but are actively growing and can cause symptoms or lead to pathological fracture. They have well-defined margins on radiographs but may expand and thin the cortex. Usually they have only a thin rim of reactive bone. An example is Aneurysmal bone cyst. Treatment usually consists of extended curettage.
- **Stage 3. AGGRESSIVE:** Locally destroying tumors eg Giant cell tumor. Treatment consists of extended curettage, marginal or even wide resection, and local recurrences are common

3. Sir Differential diagnosis of simple bone cyst are:

A. Giant cell tumour

B. Non ossifying fibroma

C. Enchondroma

D. Fibrous dysplasia

E. Eosinophilic granuloma

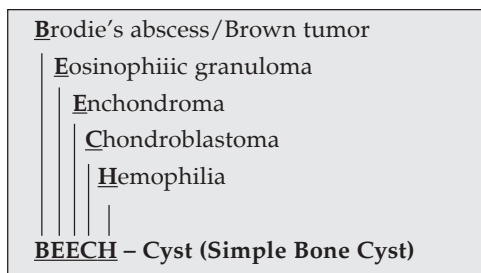
Ans. All of them because all are cystic cavities

- Radiolucent Bone Lesion With Well Defined Borders  
Eccentric, Expansile (NAG – EXPANDS)

Non ossifying fibroma  
|  
Aneurysmal bone cyst  
|  
Giant cell tumor  
|  
Eccentric  
|  
NAG – Expands

4. Centric Nonexpansile (or minimally expansile) Cysts with Marginal Sclerosis (**BEECH - CYST**)

Ans.



5. Sir a question comes that, a 8 year old boy presented with pain in the arm. On x ray his upper end of humerus has an expansile lesion in the metaphysis with breach of overlying cortex. Diagnosis is Aneurysmal bone cyst or unicameral bone cyst.

Ans. 1<sup>st</sup> decade upper end of humerus an expansile lesion the first choice will be Unicameral bone cyst. Please remember that both the cysts are expansile.

I understand few books have taken this answer as aneurysmal bone cyst and ruled out unicameral cyst on the basis that it is non expansile and that's not appropriate as both the cysts are expansile but ABC is more expansile. So in combination with other factors, age and upper humerus -UBC will be preferred. Also remember ABC is more common in lower limbs.



**QUESTIONS FROM STUDENTS IN DELHI! JAIPUR!**

1. Sir which is the tumor that is purely epiphyseal and is seen before skeletal maturity

Ans. Chondroblastoma also remember that GCT is seen after skeletal maturity and is epiphyseometaphyseal

2. Sir can GCT occur before skeletal maturity

Ans. Yes very rarely and in that case it is metaphyseal

3. Sir if in PGI if it comes GCT is seen at should we mark both Epiphysis and Metaphysis

Ans. Yes

4. Sir Curettage and bone grafting is done in all except-

- A. GCT
- B. ABC
- C. SBC
- D. Fibrous dysplasia

Ans. Curettage and bone grafting is done for all the lesions but for Giant Cell tumor many other procedures are being done like excision, arthrodesis or replacement hence it will be the answer of choice here.

5. DD of lesion, histologically resembling GCT in small bones of hands/feet, includes all except

- A. ABC
- B. Fibrosarcoma
- C. Osteosarcoma
- D. Hyperparathyroidism

Ans. All the following have giant cells in them but osteosarcoma is least preferred in cases distal to knee and elbow especially hand.

6. What percentage of giant cell tumour of bones are malignant

Ans. 5 % of GCT are malignant and 2 to 5 % throw metastases to lungs.



**QUESTIONS BY STUDENT IN PUNE! CHENNAI! JODHPUR**

1. Sir can you please tell me what is another name for ivory osteoma?

Ans. Ivory osteoma is most common tumor involving skull vault and is also known as compact osteoma or eburnated osteoma. It is often asymptomatic requiring no treatment. It is associated with Gardner's syndrome.

2. **Sir what is High dose methotrexate?**

**Ans.** The high dose Methotrexate is  $>500\text{mg}/\text{m}^2$  but used in osteosarcoma is  $8-12\text{ g}/\text{m}^2$ . It is used in T 10 protocol of osteosarcoma.

3. **Sir What is T 10 protocol?**

**Ans.** T 10 protocol by Rosen refers to a step wise approach to osteosarcoma that means neoadjuvant chemotherapy is given in which high dose methotrexate is given followed by surgical excision of tumor followed by biopsy of the excised mass and based on necrosis in the osteosarcoma mass adjuvant chemotherapy is decided. One more thing is often asked in questions the drug not used in T 10 protocol answer to which is Etoposide.

4. **Sir A 8yr/male progressive swelling upper end tibia – irregular, local temperature raised, variable consistency and ill defined margins:** (DPG 2009)

- |                       |                         |
|-----------------------|-------------------------|
| A. Giant cell tumor   | B. Ewings sarcoma       |
| C. Osteogenic sarcoma | D. Secondary metastasis |

**Ans.** Is Osteogenic sarcoma

The clinical presentation in question can occur both in Ewing's sarcoma and osteosarcoma. However, swelling is around the knee joint at upper end of tibia, which favours the diagnosis of osteosarcoma (metaphyseal lesion).

Ewing's sarcoma usually occurs in the diaphysis of the bone (middle of the shaft). Also remember that in case of conflict between age and part of bone affected part is given preference as in this question age goes towards ewings sarcoma (1<sup>st</sup> decade) and part towards osteosarcoma so answer is osteosarcoma.

5. **Sir than part of bone affected should be the basis of decision for diagnosis**

**Ans.** No the basis of diagnosis of any bone tumor is biopsy and for any infection is culture.

6. **Sir can you please tell the pulsatile bone tumors**

**Ans.** Osteosarcoma, ABC, Angioendothelioma of bone and GCT  
Amongst metastasis Renal and Thyroid have pulsatile metastasis.



### QUESTIONS FROM STUDENTS IN HYDERABAD! PUNE

1. **Sir Hyperglycemia is associated with**

- |                     |                   |
|---------------------|-------------------|
| A. Multiple Myeloma | B. Ewing sarcoma  |
| C. Osteosarcoma     | D. Chondrosarcoma |

**Ans.** Chondrosarcoma has highest rates (85%) of hyperglycemia although all other tumors can also cause it but in them the frequency is not that high.

2. **Sir According to a newer hypothesis Ewings sarcoma arises from**

- |                     |              |
|---------------------|--------------|
| A. Epiphysis        | B. Diaphysis |
| C. Medullary cavity | D. Cortex    |

**Ans.** This is one of the most frequently asked questions please remember that Ewings is a round cell tumor that belongs to the family of primitive neuroectodermal tumors and it arises from medullary cavity and from metaphysis.

3. **Sir metaphysis but ewings is diaphyseal tumor**

**Ans.** Yes ewings is diaphyseal tumor with origin from metaphysis

4. **Sir for all sarcomas grade is an important parameter why not for ewings sarcoma**

**Ans.** Because all ewings are high grade tumors

5. **Sir ewings is highly radiosensitive tumor even than it is not number one choice for its treatment**

**Ans.** All metastatic bone tumors need to be aggressively managed with chemotherapy as they throw micrometastases and metastases for which chemotherapy is treatment of choice and better than Radiotherapy.

6. **Sir, what will be order of poor prognostic factor of Ewings Sarcoma. If we have to choose between fever and thrombocytosis.**

**Ans.** Sorry we Can not choose because there is no RCT comparing these parameters but two factors with worst prognosis in Ewings sarcoma are metastasis and chemoresistance.



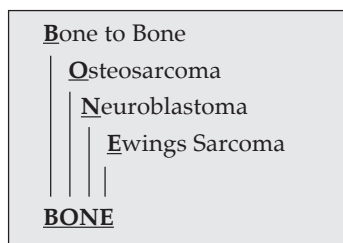
## QUESTIONS FROM STUDENTS IN LUDHIANA! AJMER!

1. Sir 60 yr, male with bone pain and vertebral collapse and fracture pelvis diagnosis is-Metastasis, Multiple Myeloma, TB, hemangioma.

Ans. More than 40 years you must always remember metastasis is the most important consideration if they additionally mention High ESR and hypercalcemia than you must think of Multiple Myeloma. Here metastasis is preferred.

2. Sir can you please tell the tumors that go from one bone to other:

Ans. The mnemonic for them is ...BONE



3. Sir most common primary for Bone metastasis?

Ans. Breast-Prostate-Lung-Kidney

4. Sir Even for unknown primary

Ans. For unknown primary it is Lung > Kidney

5. Sir SBC is true Cyst?

Ans. Yes, SBC is True Cyst (Wall is Lined by Cells)

ABC is Psudocyst

Single cavity in centre of Bone – SBC

Multiloculated, Eccentric Cavity in Bone – ABC.

6. Sir Radiotherapy in orthopaedics is used for what tumors?

Ans.

1. GCT of spine

2. Pigmented Villonodular synovitis

3. Hemangioma

4. Multiple Myeloma, Lymphoma, Ewings Sarcoma

5. Metastasis except kidney

7. Sir, Radiotherapy above how much dose and time can cause secondary radiation sarcoma?

Ans. >2500 cGy after a period of 10-15 years and above >50 Gy the risk is very high. The incidence of radiation induced Sarcoma is Osteosarcoma > Fibrosarcoma > MFH

8. Sir closest to Giant Cell Tumor is .... Non-ossifying Fibroma or Chondroblastoma ?

Ans. Closest differential to GCT is Aneurysmal Bone Cyst amongst, the two asked lets compare.

| Giant Cell Tumor                                                     | Non-ossifying Fibroma | Chondroblastoma                    |
|----------------------------------------------------------------------|-----------------------|------------------------------------|
| 1. Lytic                                                             | Lytic                 | Calcifications                     |
| 2. After Skeletal maturity if before skeletal maturity in metaphysis | Metaphysis            | Epiphysis before skeletal maturity |
| 3. Eccentric                                                         | Eccentric             | Central                            |
| 4. Lower limb                                                        | Lower limb            | Upper limb                         |

Thus characters of Non-ossifying fibroma are closer than Chondroblastoma. Hence non-ossifying fibroma is preferred here.

9. Sir How do we differentiate between Ewings and PNET (Primitive Neuroectodermal tumors)

Ans. Ewings is poorly differentiated and Neuroectodermal tumors are well differentiated

| Immuno-histo-chemistry                                            | Ewings Sarcoma | PNET     |
|-------------------------------------------------------------------|----------------|----------|
| CD99, Vimentin                                                    | Positive       | Positive |
| Neuron Specific Enolase (NSE), PGP 9.5, S100, Chromagranin, Leu 7 | Negative       | Positive |

10. **Sir, Ewings most common metastasis to Lung or Bone**

Ans. Lung > Bone

11. **Most common Primary Bone tumor causing pulmonary metastasis.**

Ans. Osteosarcoma > Ewings Sarcoma

12. **Sir, most common tumor of multicentric origin**

Ans. Benign – GCT

Malignant – Ewings

Overall GCT > Ewings

13. **Sir what is POEMS syndrome**

Ans. Polyneuropathy, Organomegaly. Endocrinopathy, Mprotein and Skin changes is associated with multiple myeloma.

4

## 5. FRACTURE AND FRACTURE HEALING

1. **MC cause of pathological fracture is osteoporosis or secondary deposits.**

Ans. Osteoporosis > Metastases, But in India the most common cause is nutritional disorder



### QUESTIONS FROM STUDENTS IN JAIPUR! DELHI! CHANDIGARH!

1. **Sir what is the difference between Modelling and remodeling?**

Ans. Modelling is a term used by bone pathologists it is a shape defining process and plays an important role in growing skeleton and has osteoclastic activity at tension site and osteoblastic activity at compression site .

Remodelling is a process which is active in adult skeleton for renewing the bone surface it involves resorption of bone by osteoclast and subsequently, osteoblasts deposit new bones at the site of resorption .Thus there is both osteoblastic and osteoclastic activity at the same site. In cases of tensile forces(distractive forces) the remodeling takes place at tension site and in case there are compressible forces than remodelling takes place at compression site. Remodelling is the last stage of fracture healing.

2. **Sir can you explain compression surface or tension surface and which of them has osteoblastic activity and which has osteoclastic activity?**

Ans. 'Bone is not like a straight rod its like a bent Banana hence these surfaces' Tension surface is convex surface of bone and compression surface is concave surface of bone.Overall osteoclastic activity occurs at tension surface and osteoblastic activity at compression site!

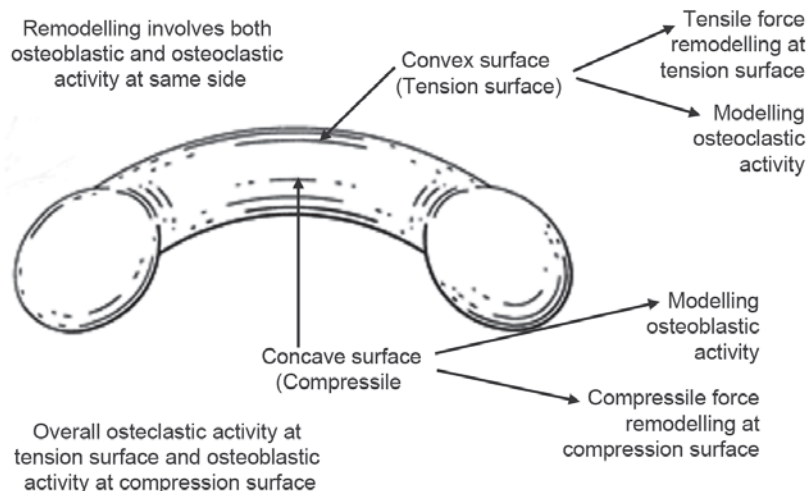


Fig. 5.1: Overall osteoclastic activity at tension surface and osteoblastic activity at compression surface.

3. Stress fractures in metatarsals is most common at:

- A. Head
- B. Neck
- C. Shaft
- D. Any of the above

Ans. 2nd metatarsal shaft > 3rd metatarsal shaft.

4. Sir direct impact on the bone will produce:

- A. Transverse fracture
- B. Oblique fracture
- C. Spiral fracture
- D. Communitated fracture

Ans. Direct trauma will produce Transverse fracture > comminuted fracture.

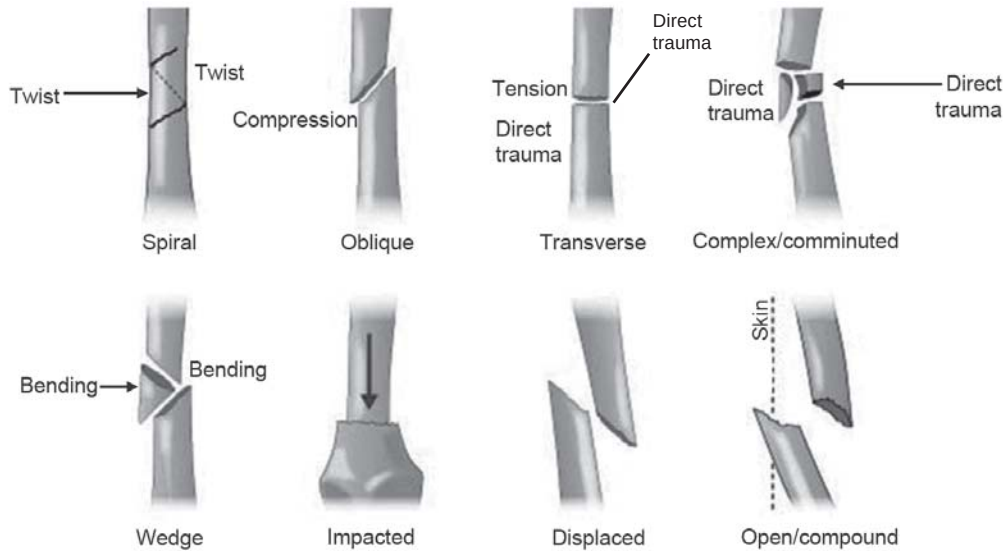


Fig. 5.2: Fracture Pattern and Mode of injury

## 6. ADVANCE TRAUMA LIFE SUPPORT

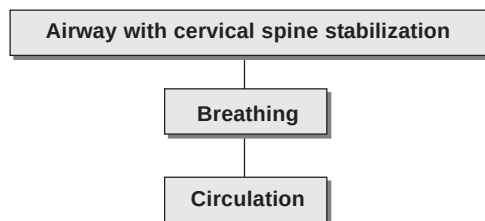


### QUESTIONS FROM STUDENTS IN BIKANER! SURAT

1. On accident there is damage of cervical spine first line of management is

- A. X-ray
- B. Turn head to side
- C. Maintain airway
- D. Stabilise the cervicle spine

Ans.



In case you have to choose one it is cervical spine stabilization before Airway maintenance.

2. Sir which part of spine involvement causes hypotension lower cervical or thoracic

Ans. Remember three changes in vital signs that suggest a cervical or upper thoracic fracture with spinal cord injury (above the level of T6): hypotension, hypothermia, and bradycardia. Please remember when there is an injury to lower cervical spine than thoracic spine will also be involved. Hence both levels will cause hypotension but lower cervical is preferred over thoracic as the answer of this question.

3. How do we estimate newly synthesized osteoid mineralization

Ans. Tetracycline labelling.

## 7. UPPER LIMB TRAUMATOLOGY

1. Bankart's lesion mc site:

- A. Anterior or
- B. Antero-inferior

Ans. Bankart's lesion is tear in anterior part of glenoid labrum.

In 1938, Bankart published his classic paper in which he recognized two types of acute dislocations. In the first type, the humeral head is forced through the capsule where it is the weakest, generally anteriorly and inferiorly in the interval between the lower border of the subscapularis and the long head of the triceps muscle. In the second type, the humeral head is forced anteriorly out of the glenoid cavity and tears not only the fibrocartilaginous labrum from almost the entire anterior half of the rim of the glenoid cavity, but also the capsule and periosteum from the anterior surface of the neck of the scapula. This traumatic detachment of the glenoid labrum has been called the *Bankart lesion*.



### A QUESTION BY STUDENT IN LUCKNOW ! PUNE!

1. Sir can you please tell me which is the most common nerve involved in inferior dislocation of shoulder?

Ans. The most common type of shoulder dislocation is anterior, involving axillary nerve. Inferior dislocation is rare and it also involves axillary nerve. Most of students marked it as musculocutaneous nerve!

2. Sir what is fat pad sign and malgaigne fracture?

Ans. Malgaigne's fracture is used for two fractures one is in fracture pelvis causing fracture of pubic rami and ipsilateral sacroiliac area and second is supracondylar fracture humerus. In supracondylar fracture humerus the fat pad is normally seen at elbow it may be elevated due to swelling of fracture and here fracture is otherwise not evident on X-ray.

3. MC injury in child 7yrs old with fall on outstretched hand

- A. Colles fracture
- B. Supracondylar fracture humerus
- C. Clavicle fracture
- D. Shoulder dislocation

Ans. Supracondylar fracture humerus

**"FOOSH" (Fracture due to Fall On Outstretched Hand)**

- Fracture clavicle
- Surgical neck of humerus fracture
- Supracondylar fracture Humerus and Lateral Condyle fracture Humerus
- Head and Neck fracture of Radius
- Colles fracture
- Fracture scaphoid
- Galeazzi fracture dislocation
- Radial styloid fracture

Colles fracture is seen in elderly, dislocations are rare in children and amongst supracondylar and clavicle fracture supracondylar fracture is more common in children so it will be the preferred answer here.

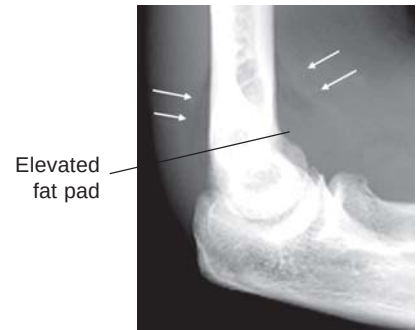


Fig. 7.1: Fat Pad Sign



## QUESTIONS FROM STUDENTS IN MUMBAI! SURAT! BARODA

1. Sir what is the order of fractures in children:

**Ans.** Distal radius and ulna is the most common site of fracture in children accounting for nearly a quarter of fracture. Radius > Ulna.

- 2nd in frequency is Hand injury
- 3rd in frequency are elbow injuries amongst them supracondylar fracture humerus are most common and
- 4th common is clavicle fracture
- Please remember that Clavicle is the most common fractured bone in adults and during birth.

2. In myositis ossificans mature bone is seen:

- At periphery
- In center
- Whole muscle mass
- In the joint capsule

**Ans.** Myositis ossificans calcification is seen At Periphery and in Osteosarcoma in Centre.



Dense rim  
Lytic centre  
Myositis mass  
Remember it is opposite in osteosarcoma

Fig. 7.2: X-ray: Elbow- Myositis Ossificans



## QUESTIONS FROM STUDENTS IN DELHI! MUMBAI!

1. Sir can you please tell me about fracture lateral condyle humerus, Milch classification and its relation to Salter Harris classification.

**Ans.** Fracture Lateral Condyle Humerus is an epiphyseal injury but it is more commonly classified by Milch classification as compared to salter harris classification of epiphyseal injuries.

I remember it by rule of 4 :that is Milch type multiplied by salter harris stages is equal to 4

So Milch Type 1 is salter harris type 4 as :  $1 \times 4 = 4$

Milch Type 2 is Salter Harris type 2 as :  $2 \times 2 = 4$

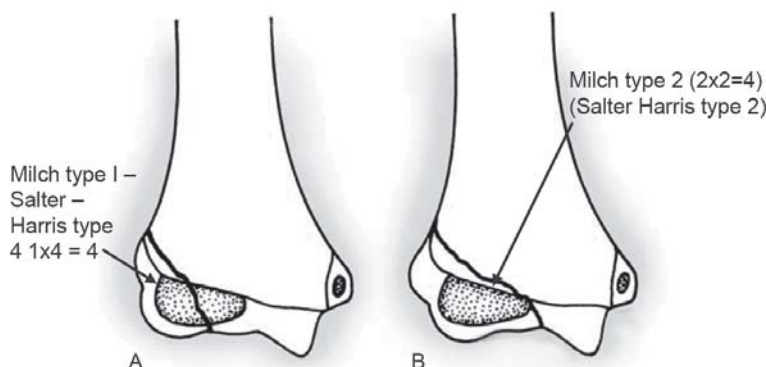


Fig. 7.3: Fracture Lateral Condyle Humerus

- Salter Harris Type I only slip of epiphysis
- Salter Harris Type II slip of epiphysis with a part of metaphysis also called a **Thurston Holland Sign**.
- Salter Harris Type III split of epiphysis
- Salter Harris Type IV split of epiphysis with a part of metaphysis
- Salter Harris Type V crushing of physis



**QUESTION FROM STUDENTS IN BHOPAL! JAIPUR!**

1. Sir Vascular Injuries in fracture or dislocation which one are priority?

Ans. Knee dislocation (Popliteal artery damage) > Elbow

2. Sir Ossification of Carpals?

Ans.

|           |   |           |   |            |   |          |         |
|-----------|---|-----------|---|------------|---|----------|---------|
| Scaphoid  |   | Lunate    |   | Triquetral |   | Pisiform |         |
| 5 yr      | + | 4 yr      | + | 3 yr       | = | 12 yr    |         |
| Trapezium |   | Trapezoid |   | Capitate   |   | Hamate   |         |
| 5 yr      | + | 5 yr      | + | 1 yr       | + | 1 yr     | = 12 yr |

Largest Carpal is Capitate and 1st to ossify is Capitate.

3. Sir most common cause of Cubitus Varus or Cubitus Valgus

Ans. Cubitus varus is malunited supracondylar humerus

Cubitus valgus is non-union lateral condyle humerus

4. Varus or Valgus means?

Ans. Varus means distal part towards midline and Valgus means distal part away from midline. They are coronal plane deformities.

5. Sir can you tell me the difference between Bennetts and Rolando fracture

Ans. Bennetts fracture is fracture base of 1<sup>st</sup> metacarpal with dislocation of trapeziometacarpal joint due to the pull of abductor pollicis longus muscle and Rolando is comminuted intra-articular fracture of base of 1<sup>st</sup> metacarpal without joint dislocation.

6. Sir isn't Rolando extra-articular fracture !

Ans. No both Rolando and Bennetts are intra-articular fractures of base of 1<sup>st</sup> metacarpal but Bennetts is with dislocation and Rolando without dislocation.

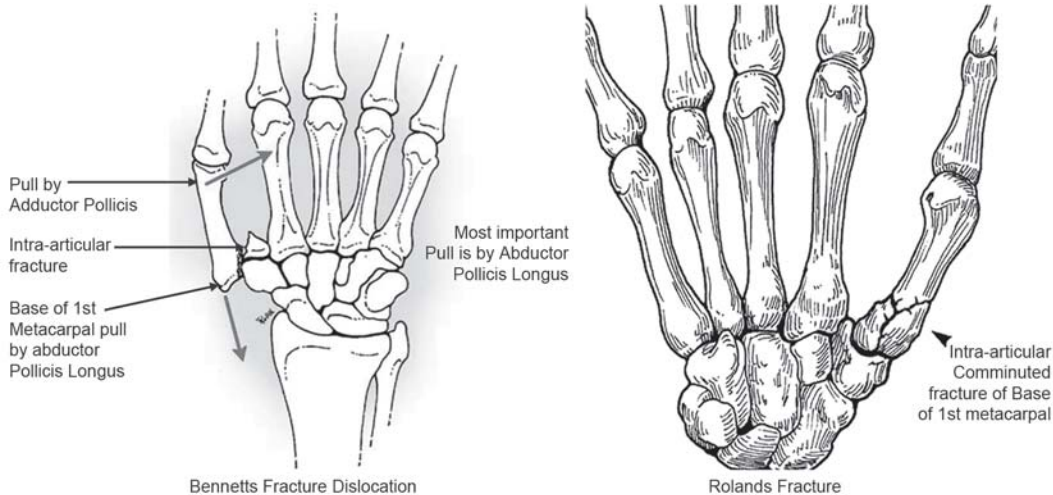


Fig. 7.4

7. Sir Lateral condyle humerus valgus or varus

Ans. In lateral condyle humerus

1. Non-union – Cubitus Valgus

2. Malunion – Cubitus Varus

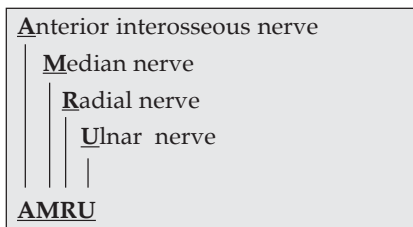
Non-union is more common than malunion so Valgus > Varus

8. Sir Tenderness in anatomical Snuffbox indicates

Ans. Fracture Scaphoid most commonly.

9. **Sir Nerve involved in Supracondylar humerus fracture median or radial**

**Ans.** Anterior interossei>Median>Radial>Ulnar Nerve



10. **Sir In colles cast is below elbow and in Smiths fracture**

**Ans.** Smiths fracture is reverse Colles and here the cast is Above-Elbow. **Note:** Colles cast is exception to rule of splintage.

11. **Sir complex regional pain syndrome most common nerve involved**

**Ans.** Median > Sciatic (Tibial) nerve are the most common nerves involved in CRPS type II.

Most common cause of CRPS type I is Colles fracture.

12. **Sir most common nerve damage due to trauma.**

**Ans.** Radial nerve

13 **Most common artery involved in trauma.**

**Ans.** Popliteal artery

14. **Sir what is volkmanns sign.**

**Ans.** In case of volkmanns contracture there is shortening of flexors causing flexion of fingers due to when wrist is neutral but when you flex the wrist fingers can be passively extended allowing tendons to gain length.

## 8. SPINAL INJURY



### QUESTIONS FROM STUDENTS IN CHANDIGARH! LUDHIANA!

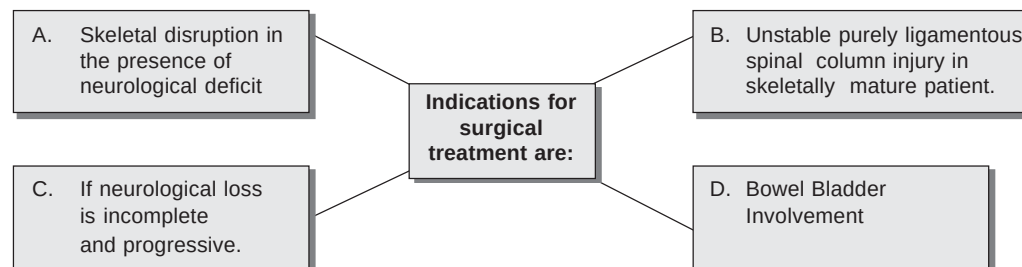
1. **Most common injury of spinal cord?**

- A. Flexion
- B. Extension
- C. Flexion rotation
- D. Compression fracture

**Ans.** Flexion rotation is the most common cause of spine injury

2. **Sir what are indications for surgery in traumatic spine injury**

**Ans.** Indications for surgery in case of spine injury



2. **Hangman fracture is**

**Ans.** Fracture of pars-interarticularis of C<sub>2</sub> (axis)

## 9. PELVIS AND HIP INJURY



### QUESTIONS FROM STUDENTS IN AHMEDABAD! DELHI

**1. Not true about Kocher Langenbach operation**

- |                                           |                                            |
|-------------------------------------------|--------------------------------------------|
| A. Adequate Exposure of posterior segment | B. Anterior segment exposure is inadequate |
| C. Superior exposure adequate             | D. Sciatic n. injury in 10% cases          |

**Ans.** Is Kocher Langenbach approach is posterolateral approach to hip and has good exposure of posterior column but limited superior and anterior exposure, incidence of sciatic nerve palsy is 2 to 6 %. This question is asked in two forms one is 3<sup>rd</sup> option has superior segment is adequately visualised in that case that option is incorrect and that will be the answer like in this question.

Another form of this question is 3<sup>rd</sup> choice mentions superior segment exposure is limited in that case this option is correct and answer to the question becomes sciatic nerve palsy is seen in 10 % cases as sciatic nerve injury is seen in 2 to 6% cases.

So observe 3<sup>rd</sup> option and then decide.

**2. Kocher Lagenbeck approach for emergency acetabular fixation is done in all except?**

- |                                                                    |                                     |
|--------------------------------------------------------------------|-------------------------------------|
| A. Open fracture                                                   | B. Progressive sciatic nerve injury |
| C. Recurrent dislocation in spite of closed reduction and traction |                                     |
| D. Morel-Lavallee lesion                                           |                                     |

**Ans.** Morel Lavallee lesions cause

#### Operative Management of fractures

#### Timing of surgery

#### Emergency

- Emergency surgery is immediate for life and limb threatening problems. Examples are:
 

|                                                                                |                                         |
|--------------------------------------------------------------------------------|-----------------------------------------|
| i. Fracture or dislocation with vascular injury                                | ii. Fractures with compartment syndrome |
| iii. Irreducible dislocation or fracture dislocation of major joint.           | iv. Compound (open) fractures           |
| v. Septic arthritis                                                            |                                         |
| vi. Spinal injuries or nerve injuries with deteriorating neurological deficit. |                                         |

In case of increasing sciatic nerve palsy we need to explore the nerve in that case we need to go through the posterior approach-Kocher Langenbach approach.

**Morel:** Lavallee lesion is a localized area of subcutaneous fat necrosis over the lateral aspect of hip caused by same trauma that causes the acetabular fracture. The operation through it has been associated with a higher (12%) rate of postoperative infection, wound dehiscence and healing by secondary intention. The presence of a significant Morel-Lavallee lesion can be suspected by hypermobility of the skin and subcutaneous tissue in the affected area from the shear type separation of the subcutaneous tissue from the underlying fascia lata.

Therefore, In the presence of Morel-Lavallee lesion posterolateral Kocher Langenbeck approach is avoided.

**3. Sir what should we remember for fracture neck femur management and treatment of choice for 4 weeks old fracture neck of femur in 55 years old is**

**Ans.** Femoral neck fractures <3 weeks fracture duration and <65 years age group is closed reduction + screw fixation (called as osteosynthesis)

> 3 weeks fracture duration and < 65 years age group – open reduction + fixation in combination with osteotomy or bone grafting (augmentative osteosynthesis).

Usually in > 65 years age group time period is of less significance and treatment is hemiarthroplasty and any age arthritis or joint damage Total Hip replacement is the preferred management.

**5. Avulsion fracture of distal tibial epiphysis displaced anterolaterally is known as**

- A. Tillaux fracture  
C. Potts fracture

- B. Cotton fracture  
D. Plafond fracture

**Ans.** Tillaux fracture occurs when medial epiphysis is fused in adolescent but unossified anterolateral part is avulsed because of its attachment to fibula in ankle injuries.  
Potts fracture is bimalleolar, cottons fracture is trimalleolar and plafond fracture is intra-articular fracture of distal end of tibia.

## 10. LOWER LIMB TRAUMATOLOGY



### QUESTIONS FROM STUDENTS IN BARODA! INDORE

1. **Sir Blunt injury to which region causes maximum vascular injury?**

- A. Knee dislocation  
C. Tibial plateau fracture
- B. Elbow dislocation  
D. Inferior dislocation of clavicle

**Ans.** Knee dislocation in 40 to 66 % cases can cause damage to popliteal artery of all the dislocations in body it is maximum associated with vascular injury

2. **Sir Watson jones approach is for?**

- A. Neglected club foot  
C. Hip replacement
- B. Muscle paralysis  
D. Valgus deformity

**Ans.** Watson jones procedure is for ankle instability and Watson jones surgical approach is anterolateral approach for hip joints. So read the question before answering whether approach is asked or operation is asked.

3. **Sir subtrochanteric fracture femur is treated by**

**Ans.** Management Options For Fracture Subtrochanteric Femur:

- Conservative – Traction
- Operative
  - 1. Dynamic hip screw (DHS)
  - 2. Condylar blade plate
  - 3. Dynamic condylar screw (DCS)

#### Intramedullary Fixation

- Russell Taylor reconstruction nail – cephalomedullary nail
- Short cephalomedullary nails eg Gamma nail
- Standard interlocking nail. Enders nail in children.

**NOTE:** Smith Paterson triflanged nail was used for internal fixation of fracture neck femur (not subtrochanteric femur).

4. **My god sir what should I remember**

**Ans.** Cephalomedullary nail

5. **Sir What is cephalomedullary**

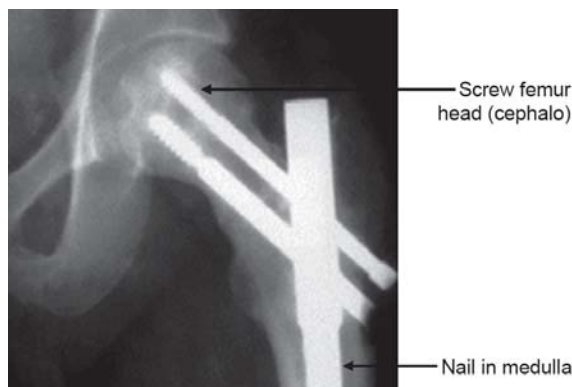


Fig. 10.1: Cephalomedullary Nail

## 11. FRACTURE MANAGEMENT



### QUESTIONS FROM STUDENTS IN MUMBAI! KOLKATA! DELHI!

1. Site for 1st order bone graft is:

- |                       |                      |
|-----------------------|----------------------|
| A. Pelvis             | B. Tibial metaphysis |
| C. Medial malleolus   | D. Femoral condyle   |
| E. Greater trochanter |                      |

**Ans.** Pelvis is site for 1<sup>st</sup> order bone grafting but rest of all can also be used as source for cancellous bone grafting

2. Sir Surgical excision contraindicated in?

- |                      |                               |
|----------------------|-------------------------------|
| A. Olecranon process | B. Patella                    |
| C. Head of radius    | D. Lateral condyle of humerus |

**Ans.** Epiphysis like lateral condyle humerus excision is contraindicated

3. Sir In hand injury 1st structure repaired should be

- |           |          |
|-----------|----------|
| A. Skin   | B. Nerve |
| C. Muscle | D. Bone  |

**Ans.** is 'D' Bone

The skin is preserved the first as there has to be an adequate soft tissue coverage over deeper structures and also Sensations of palmar skin can not be reproduced by any skin graft.

## 13. SPORTS INJURY



### QUESTION FROM STUDENTS IN MEERUT!

1. Torsion of knee results in injury most commonly to

- |                                |                               |
|--------------------------------|-------------------------------|
| A. Anterior cruciate ligament  | B. Medial meniscus            |
| C. Fibular collateral ligament | D. Tibial collateral ligament |

**Ans.** Meniscus if only torsion is mentioned and if the question mentions valgus with torsion than Anterior Cruciate Ligament.

## 14. NEUROMUSCULAR DISEASE



### QUESTIONS FROM STUDENTS IN MEERUT! PUNE!

1. Sir what is the most common cause of achilles tendonitis overall?? and insertional type?

**Ans.** Non insertional tendonitis of tendoachilles is commonest and is caused by athletic injuries (running or jumping) and most common cause of insertional tendonitis is overuse of tendon

2. Sir The kinetic energy of the body is least in one of the following phases of walking cycle? (AIIMS Nov 2003)

- |                   |               |
|-------------------|---------------|
| A. Heel strike    | B. Mid stance |
| C. Double support | D. Toe off    |

**Ans.** Heel strike

## 15. PERIPHERAL NERVE INJURY



### QUESTIONS FROM STUDENTS IN DELHI! CHANDIGARH!

- Paralysis of arm of an athlete the test with best recovery prognosis?**  
A. EMG-Electromyography B. Strength Duration curve  
**Ans.** Electromyography is the best indicator of nerve recovery after injury or after nerve repair.
- SIR worst prognosis in injury is of which of the two nerves?**  
A. Ulnar or B. Lat popliteal  
**Ans.** Sciatic nerve>Lateral popliteal nerve> Ulnar nerve (worst to better)
- Sir What is the difference between book test and froment sign**  
**Ans.** Book test tests the function of adductor pollicis supplied by ulnar nerve .Patient can hold the book between thumb and palm.  
**Froment Sign:** In case of ulnar nerve palsy adductor pollicis is paralysed So patient holds book between thumb and index finger by using Flexor Pollicis longus (supplied by Anterior interosseus nerve ). This produces flexion at interphalangeal joint, while holding book. This is Froment sign.

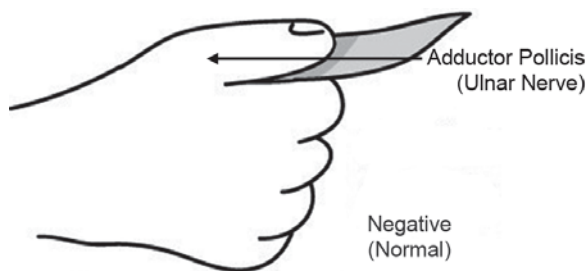


Fig. 15.1: Book Test

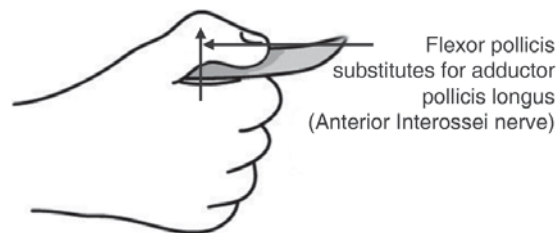


Fig. 15.2: Froment Sign

- Sir Tarsal tunnel syndrome is caused with which arthritis**  
A. Ankylosing spondylitis B. Osteoarthritis  
C. Rheumatoid arthritis D. Psoriatic arthritis  
**Ans.** Order of causes are Idiopathic >Osteoarthritis>Rheumatoid arthritis>Ankylosing Spondylitis.
- Sir most common nerve injured in inferior dislocation of shoulder.**  
**Ans.** Both anterior or inferior dislocation shoulder axillary nerve is involved.
- Sir what is circumflex nerve**  
**Ans.** Another name for axillary nerve.

## 16. JOINT DISORDERS



### QUESTIONS FROM STUDENTS IN MEEURT! AHMEDABAD!

- Which of the following statements about changes in articular cartilage with aging is not true?**  
A. Total proteoglycan content is decreased  
B. Synthesis of proteoglycan decreased  
C. Enzymatic degradation of proteoglycan is increased  
D. Total water content of cartilage s decreased.

Ans. Enzymatic degradation of proteoglycan is increased

| Cartilage property                | Aging     | Osteoarthritis                       |
|-----------------------------------|-----------|--------------------------------------|
| • Total water content (Hydration) | Decreased | Increased (Decreased in advanced OA) |
| • Proteolytic Enzymes:            | Normal    | Increased                            |
| • Proteoglycan content            | Decreased | Decreased                            |

2. **Sir not seen in osteopetrosis:**

- A. Compression of cranial Nerve
- B. Osteomyelitis of mandible
- C. Pancytopenia
- D. Delayed healing of bone

Ans. Cranial nerve compression due to bone encroachment on foramina may occur.

- Osteomyelitis of the mandible is common due to pancytopenia
- Bone encroachment on marrow results in bone marrow failure with resultant pancytopenia.
- Fractures usually heal at slower rates in osteopetrosis but few studies have shown fracture healing is normal
- Thus all 4 options are correct in case we have to choose one it will be delayed healing of fracture as there is no debate about other features.

3. **Sir False for charcot joints in Diabetes Mellitus -Limitation of movement, Arthrodesis, Total ankle replacement, Arthrocentesis**

Ans. Charcot's joint disease is usually managed with 2 approaches one is brace, that is protected weight bearing and second is arthrodesis.

Regarding the replacements there are two schools of thought if it is asked for ankle Charcot's disease then replacement is not a preferred procedure for ankle, arthrocentesis that is joint debridement can be carried out but its results are also variable. If the question is asked about knee Charcot's then knee replacement can be done (it is now carried out with recent advances in joint replacement procedures) and for knee Charcot's arthroscopic lavage has been proved to be of no benefit. Here the question is for ankle thus answer here will be Total ankle replacement not performed.

4. **Sir does that mean for knee Charcot's joint replacement can be carried out**

Ans. Yes but results are not as good as osteoarthritis.



## QUESTIONS FROM STUDENTS IN LUCKNOW! AHMEDABAD!

5. **Sir A 68 yr old man came with pain and swelling of right knee. Ahlback grade 2 osteoarthritic changes were found on investigation. What is further management:**

- A. Arthroscopic washout
- B. High tibial osteotomy
- C. Total knee replacement
- D. Conservative

Ans. Classification system and stage wise management for OA knee

1. Initial treatment is always conservative
2. Clinical picture is more significant than radiology or x-ray changes
3. If activities of daily living are affected surgery is advised
4. Surgery for young is HTO (if not contraindicated) if contraindicated TKR is performed
5. Surgery for elderly (>60 YEARS) is TKR
6. HTO-High Tibial Osteotomy
7. TKR-Total Knee Replacement.

| Ahlback Grade                         | Definition                        | Treatment in Young                                                | Treatment in Elderly      |
|---------------------------------------|-----------------------------------|-------------------------------------------------------------------|---------------------------|
| Grade 1                               | Joint space narrowing (<3 mm)     | Conservative if fails HTO                                         | Conservative if fails TKR |
| Grade 2                               | Joint space obliteration          | Conservative if fails HTO                                         | Conservative if fails TKR |
| Grade 3                               | Minor bone attrition (0-5 mm)     | Conservative if fails surgery if bone loss <3mm HTO otherwise TKR | Conservative if fails TKR |
| Grade 4                               | Moderate bone attrition (5-10 mm) | TKR                                                               | TKR                       |
| Grade 5                               | Severe bone attrition (>10 mm)    | TKR                                                               | TKR                       |
| >3mm bone loss HTO is contraindicated |                                   |                                                                   |                           |

6. So Sir if they ask what next will it be conservative

Ans. Yes surgery will be advised once they mention patient has limitation of activities of daily living .

7. Sir what surgery

Ans. Depends on age; in young High Tibial Osteotomy and elderly Total Knee Replacement

8. Sir what about Arthroscopic lavage for osteoarthritis knee when will we mark it as an answer?

Ans. It is not usually advised for treatment of osteoarthritis its only indication in osteoarthritis is a mechanical symptom of locking caused by loose body or meniscal tear.

9. Sir Loose body what loose body sir.

Ans. Osteophytes seen in osteoarthritis can present as loose bodies once they are detached, from articular surface.

10. Sir What about the indications of unicondylar or partial knee replacement.

Ans. The indications for unicondylar knee replacement that is only one compartment of knee being replaced are same as High Tibial Osteotomy and most studies claim HTO has an advantage over unicondylar replacement.

11. Sir Can high Tibial osteotomy be done for valgus deformity of knee.

Ans. Yes but it has to be Unicompartmental Osteoarthritis.



### QUESTIONS FROM STUDENTS IN MEEURT! JAIPUR!

1. Sir A 65 years man with history of back pain since 3 months. ESR is raised .On Examination there is tenderness of dorsolumbar region and mild restriction of chest movements is found. On X ray syndesmophytes are present in vertebrae. Diagnosis is:

- A. Ankylosing spondylitis
- B. Degenerative osteoarthritis of spine
- C. Ankylosing hyperostosis
- D. Lumbar canal stenosis

Ans. Ankylosing Hyperostosis

|                 | Ankylosing Hyperostosis | Ankylosing Spondylitis             |
|-----------------|-------------------------|------------------------------------|
| Age             | Elderly                 | Young                              |
| Sacroilitis     | Absent                  | Always present                     |
| Chest expansion | Mild restriction        | Marked but not reliable in elderly |
| Tenderness      | Dorsolumbar             | Sacroiliac                         |
| ESR             | Normal to mild rise     | High                               |
| Syndesmophytes  | Present                 | Present                            |

2. Sir why not Ankylosing spondylitis

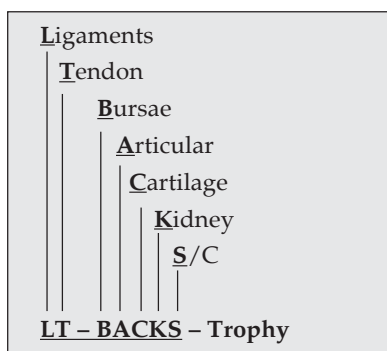
Ans. Diagnostic Criteria – Modified New York Criterion

- Essential criteria is definite radiographic sacroilitis • Supporting criteria: one of these three
- Inflammatory back pain
- Limited chest expansion (<5 cm at 4thICS) not a reliable criterion in elderly because of pulmonary disorders
- Limited lumbar spine motion in both sagittal and frontal plane (Schober test /Modified Schober test)

To diagnose Ankylosing Spondylitis we need radiographic sacroilitis which is not mentioned in this case also age group for ankylosing spondylitis is young and not elderly which is the age group for Ankylosing hyperostosis.

3. Sir gout crystal deposition occurs at what all structures

Ans. Gout crystals are deposited at all these places they are called as tophi!



4. **Sir mc site of pseudotumour like growth in hemophilic arthroplasty:**  
 A. Quadriceps B. Hamstring C. Gastrocnemius D. Iliopsoas

Ans. Iliopsoas>quadriceps

5. **Sir Most common cause of Reiter's syndrome**

Ans. Chlamydia

6. **Sir Most common cause of Diarrhoea associated reiter's syndrome**

Ans. Shigella

7. **Sir Most common cause of STD associated reiter's syndrome**

Ans. Chlamydia

8. **Sir can you please tell about extraskeletal (ectopic)calcification and ossification**

Ans. Metastatic calcification (calcium and phosphate product >75) Hypercalcemic states (hyperparathyroidism, CRF, Vitamin D intoxication, Sarcoidosis, Renal failure), Hyperphosphatemia (Tumor calcinosis, renal failure, tumor lysis)

Dystrophic calcification-SLE, Dermatomyositis and Scleroderma

ECTOPIC ossification-Myositis ossificans-Post surgery, Burns, Neurologic injury or trauma. Or Fibrodysplasia ossificans progressive

Tumoral calcinosis -(contains hydroxyappetite crystals or amorphous calcium phosphate complexes) bilateral periarticular calcification seen due to high phosphate and normal calcium but their product more than 75. The masses are near major joints but extracapsular.

#### Dystrophic calcification

Soft tissue calcification calcinosis circumscripta

Deeper tissue calcification -calcinosis universalis

#### Ectopic ossification

1. Myositis ossificans-true extraskeletal bone formation with organised as lamellar or tubercular ,with normal osteoblasts and osteoclasts conducting active remodeling.It is seen after Surgery,trauma,burns or neurologic injury.
2. Fibrodysplasia ossificans progressive-inherited ectopic bone formation.

The marker for heterotropic ossification is Alkaline phosphatase and for tumor calcinosis is serum phosphate levels.

9. **A patient present with hetrotrophic ossification around bilateral knee joint, the lab investigation of choice in him**

- A. Serum calcium B. Serum alkaline phosphatase  
 C. Serum phosphorus D. Serum acid phosphatase

Ans. is 'D' Serum Phosphate

- Tumor calcinosis is a rare condition which primarily, but not exclusively affects black people in otherwise good health.
- This disease usually presents in the second decade of life and is characterised by deposition of painless calcific masses bilaterally around knee,hip, elbow or shoulder
- The primary defect responsible for this metastatic calcification appears to be hyperphosphatemia resulting from the increased capacity of renal tubula and intestines to absorb phosphate.
- The most common laboratory findings are hyperphosphatemia and elevated serum 1,25-dihydroxyvitamin-D levels. Serum calcium, parathyroid hormone and alkaline phosphatase levels are usually normal.

Surgical excision is the most successful form of treatment if indicated although recurrences are common. Medical treatment to control the hyperphosphatemia (e.g. a low phosphate diet and oral phosphate binders) is an important adjuvant to surgical excision.

| Parameter | Myositis Ossificans | Tumor Calcinosis    |
|-----------|---------------------|---------------------|
| Etiology  | Traumatic           | Idiopathic/Familial |
| Side/Site | Unilateral-Elbow    | Bilateral-Knee      |
| Symptom   | Painful             | Painless            |
| Marker    | ALP increased       | Increased $PO_4$    |

If they ask unilateral knee then mark ALP, as myositis will be the diagnosis in case of unilateral calcification. Sometimes a question comes about marker of heterotropic ossification in that case Alkaline phosphatase will be the marker as heterotropic ossification takes place due to increased osteoblastic activity for which alkaline phosphatase is the maker. If they ask Bilateral Knee Calafication than tumor calcinosis will be the answer.

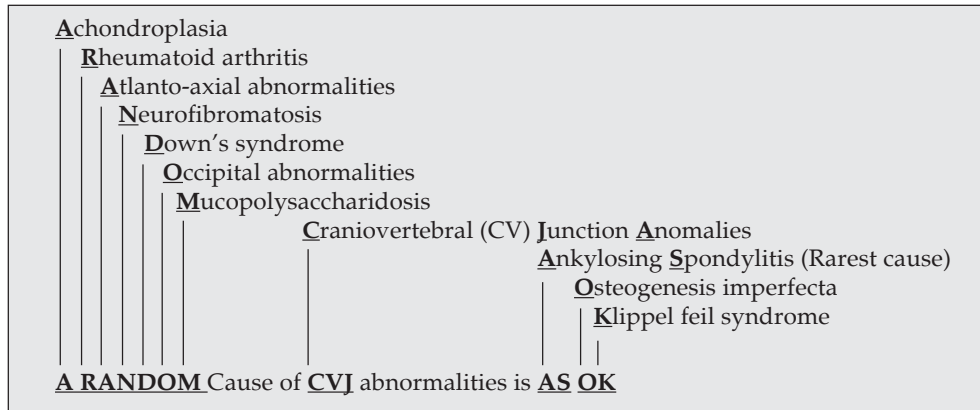


## QUESTIONS FROM STUDENTS IN KOLKATA! BARODA! MANGLORE

1. Sir following are associated with CV junction anomalies except:

- A. Basilar invagination      B. Odontoid dysgenesis      C. Ankylosing spondylosis      D. Rheumatoid arthritis

Ans. is 'C' Ankylosing spondylosis



## 17. METABOLIC DISORDERS OF BONE



## QUESTIONS FROM STUDENTS IN LUDHIANA! DELHI!

1. What are diastatic fractures? Most common bone associated?

Ans. Diastatic fractures are fractures are separation of cranial bones at sutures

2. Bony abnormality seen in incontinentia pigmentii.

Ans. Bony abnormalities are Hemivertebra, scoliosis, spina bifida, syndactyly and absent hands

3. Is shephard crook deformity characteristic of fibrous dysplasia?? Or is seen elsewhere.

Ans. Bone softening disorders like osteogenesis imperfecta, Paget's or fibrous dysplasia, all can cause Shephard Crook deformity but it is most characteristically described for Fibrous Dysplasia.

4. Sir, OSMIC ACID is used for

Ans. Actually not used now but was used earlier for chemical synovectomy often in Hemophilia. Also remember chymopapain is used for chemonucleolysis that is chemical degradation of nucleus pulposus in case of disc prolapse, this also is not used now.

5. Sir shohl's solution is used in

Ans. sodium citrate + citric acid used in rickets associated with renal tubular acidosis

6. Sir Stoss regimen:

Ans. Treatment schedule for rickets in which Vit D is administered where total of 6 lakh units of vitamin D are given and then on x-rays radiological sign of calcification is noticed.

7. Sir what is the best marker for vit D deficiency:

- A. ALP      B. Acid phosphatase  
C. Serum  $\text{PO}_4$       D. Vit D levels

Ans. This is a good question please understand in this question it is asked best marker of vitamin D deficiency and the appropriate answer is Vitamin D levels. The parameter usually used to monitor treatments are Alkaline Phosphatase levels. If the question is asked best marker of rickets then ALP levels will be the answer as there are multiple causes of rickets and in all of them there is increased alkaline phosphatase

8. **Sir is not Rickets Vitamin D deficiency**

**Ans.** Rickets is actually defect in mineralization of bone and vitamin D deficiency is one of the causes hence monitoring only vitamin D levels will be inappropriate as they are not altered in all rickets thus it is better to measure Alkaline phosphatase for rickets.

9. **A doubt sir in which condition is Windswept deformity seen? Some books say RA, others say Rickets? American authors have published RA, British have published Rickets...which one to pick sir?**

**Ans.** Both diseases have wind swept deformity Rickets at knees and at hand in RA but classically it has been named for rickets. It is called as tackle deformity also.  
Thus pick up Rickets!

## 18 . PEDIATRIC ORTHOPAEDICS

### QUESTIONS FROM STUDENTS IN INDORE! JODHPUR! DELHI!

1. **SIR Which fracture in children requires operative reduction:**

- A. Epiphyseal separation
- B. Both upper limb bones
- C. Dislocation of elbow
- D. Fracture humerus

**Ans.** Epiphyseal separation like lateral condyle fracture

2. **Child presenting with absent thumb radial deviation of hand what is diagnosis?**

**Ans.** Radial club hand –absent or deficiency in Radius and associated with inadequately developed thumb.

**Absent Radius or thumb is associated with**

- Trisomy 13, 18
- Fanconis syndrome
- TAR syndrome (thrombocytopenia absent radius)
- Vater syndrome (vertebral anomalies, anorectal malformation/Tracheo-oesophageal fistula/esophageal atresia/radial club hand /renal agenesis)
- Holt oram syndrome (cardiac defects with absent radius)
- Ectodermal dysplasia
- Very rarely leukemias
- Order of investigations carried out are Echocardiography than > platelets count > karyotyping > bone marrow examination.

**Treatment**

1. Centralization of ulna
2. Pollicization is transposition of finger to replace (reconstruct) absent thumb

This reconstruction of thumb is usually done by migrating index finger to the position of thumb in a patient with congenital absence or marked hypoplasia of thumb

3. Tendon transfers

3. **Sir what is congenital scoliosis.**

**Ans.** Congenital scoliosis Lateral curvature of spine associated with vertebral anomalies

4. **Sir Which of the following is least likely to be associated with progressive congenital scoliosis:**

- A. Hemivertebra
- B. Block vertebra
- C. Wedge vertebra
- D. Unilateral unsegmented vertebra with bar

**Ans.** Least progression is in block vertebra and maximum is with unsegmented bar.

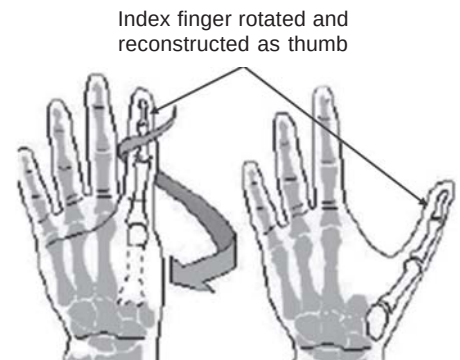


**Fig. 18.1:** Pollicization

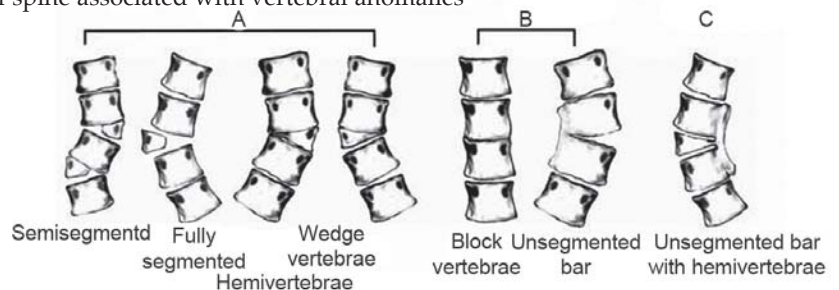
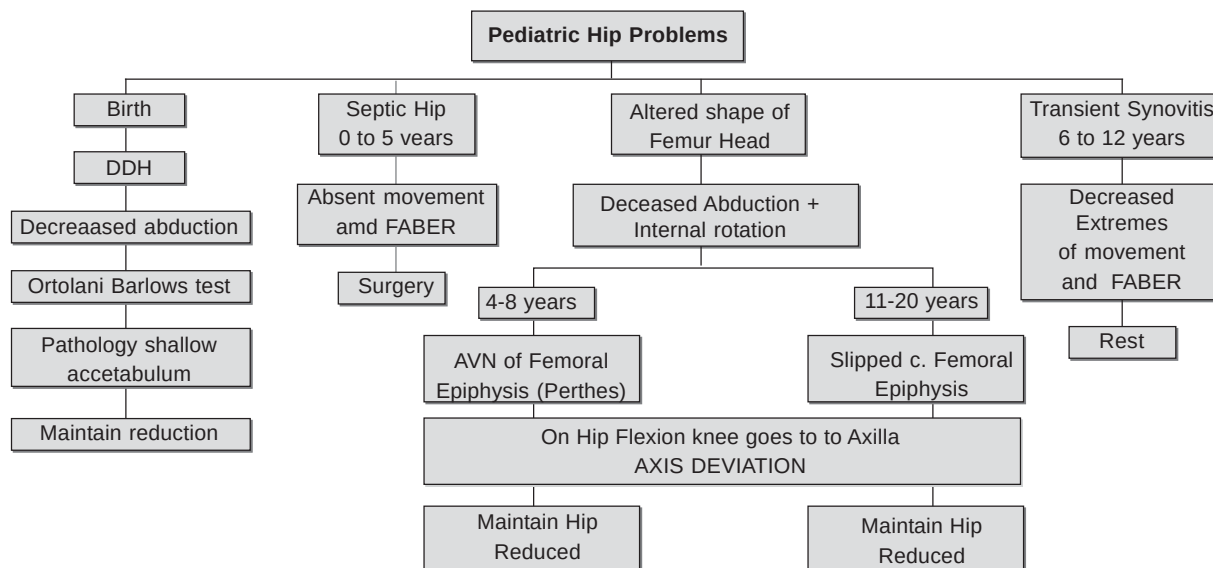


**Fig. 18.2**

5. Sir how to remember pediatric hip problems ?

Ans.



6. Sir Bone collapse in spine is more common in children because:

- More blood supply
- Fragile bone in children
- More cartilage in spine
- Children don't take bed rest

Ans. Children Don't take rest hence the weak diseased bones undergo collapse.

7. In Slipped Capital Femoral Epiphysis, slipping occurs at which zone

Ans. 5 zones of growth plate are

- Zone of resting cartilage of growth plate
- Zone of proliferation –rapid synthesis of collagen requiring vitamin C it is affected in scurvy
- Zone of hypertrophy-thickest and weakest zone involved in fractures or epiphyseal slip (Slipped Capital Femoral Epiphysis)
- Zone of maturing cartilage of growth plate (Vitamin D Dependant affected in Rickets)
- Zone of provisional calcification

In SCFE the zone of hypertrophy is affected

8. Sir what is the most common cause of genu recurvatum in children?

Ans. Congenital dislocation of knee called as genu recurvatum is the most common congenital cause and otherwise Blounts disease is the most common cause in less than 3 years of age. Blounts disease is a triad of Tibia vara ,genu recurvatum and internal tibial torsion.

9. Blounts if we have to choose between genu varum and tibia vara what should be preferred

Ans. Blounts is infantile tibia vara (<3 years) that's a preferred answer over genu varum.



## QUESTION FROM STUDENTS IN CHENNAI! BANGALORE!CHANDIGARH!

1. Sir what is the treatment of congenital talipes equino varus at birth a and why it is called clubfoot!

Ans. CTEV is called as clubfoot as it resembles club, stick used to play golf.



Fig. 18.3

### Regarding treatment of CTEV at birth

Now the principles of Ponsetti are followed and they recommend manipulation and cast as soon as possible after birth right on day 1.

The comparison between ponsetti and Kites method is also shown.

|                       | Kites method –followed earlier       | Ponsetti method now preferred |
|-----------------------|--------------------------------------|-------------------------------|
| At birth              | Manipulation by mother initial weeks | Manipulation and cast         |
| Change of cast        | Every 2 weeks                        | Weekly                        |
| Correction order      | C-A-V-E                              | C-AV-E                        |
| Fulcrum               | Calcaneocuboid joint                 | Head of talus                 |
| Duration of treatment | 6 to 9 months                        | 6 to 8 weeks                  |

In Kites method one deformity is corrected at a time but in ponsetti adduction and varus are corrected simultaneously but equinus is corrected at end in both .Ponsetti treatment may require Achilles tenotomy to correct equinus.

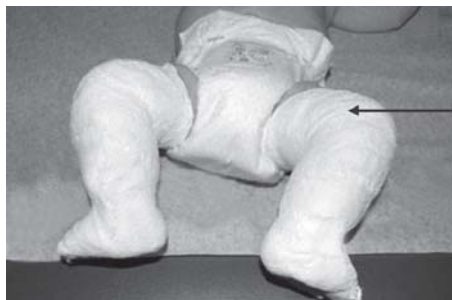


Fig. 18.4: Above knee CTEV cast

Cavus increased plantar arch  
Adduction of forefoot and mid foot  
Varus or Inversion  
Equinus  
**CAVE**

Order of correction of deformity in CTEV,if this order is not followed Rocker bottom foot can develop.



## A QUESTION FROM STUDENTS IN NAGPUR!, INDORE!

1. Sir what is the most preferred treatment for CTEV in adults.

Ans. Triple Arthrodesis that is surgical fusion of 3 joints –Talonavicular, Talocalcaneal and calcaneocuboid.

2. What is the age above which it should be performed.

Ans. The recommendations are above 10 to 12 years of age to achieve adequate fusion of bones which is not possible in less than 10 years of age.

3. Can any other procedure be used to correct CTEV in adults

Ans. YES, Ilizarov fixator can also be used to correct CTEV in adults

4. In which one rocker bottom feet more common Trisomy 13 or 18 actually don't know what's rocker bottom foot?

Ans. Rocker bottom foot, is a foot with a convex plantar surface with a apex of convexity at the talar head.. Talus is vertical so that its head forms the most prominent part of the sole. 2 principle causes are:

1. Oblique /Vertical talus

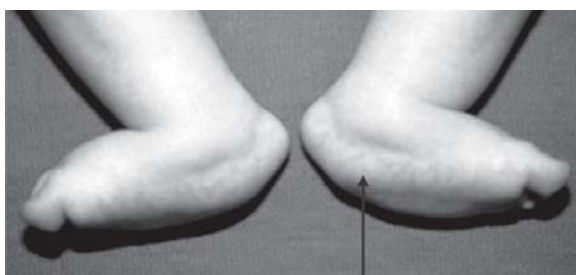
2. Improper correction of CTEV i.e. forceful correction of equines by dorsiflexion before adduction, varus and inversion may actually cause movement at mid tarsal joint (not at ankle joint) producing rocker bottom foot.

Rx \* Grice procedure is extraarticular arthrodesis of subtalar (talocalcaneal) joint.

It is Associated with Trisomy 18 > trisomy 13.



Fig. 18.5: Rocker Bottom



Convex sole like rocker bottom

Fig. 18.6: Rocker Bottom Foot

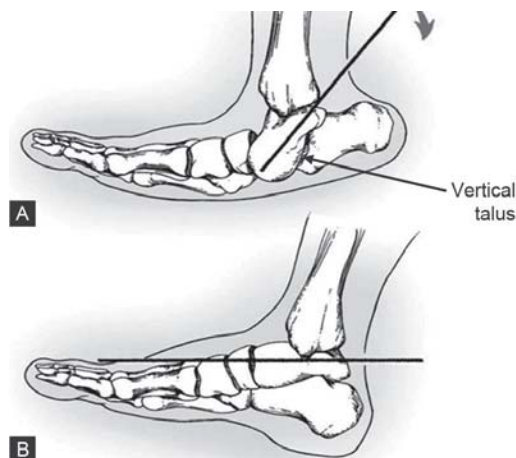


Fig. 18.7: Normal Talus

## 19. OSTEOCHONDritis

1. Indication for micro fracture? Non union or osteochondritis defect of femur

Ans. Micro fracture technique or abrasion arthroplasty – Making drill holes at the base of osteochondritis lesion causing regeneration of fibrocartilage instead of hyaline cartilage (in normal joint) thus it is replacement of hyaline cartilage with fibrocartilage.

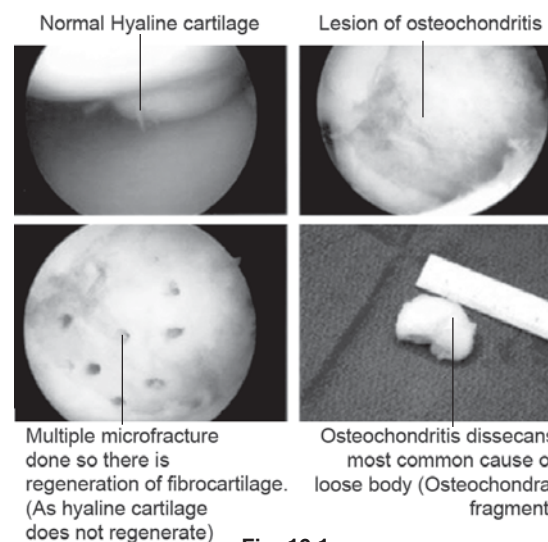


Fig. 19.1

## 20. AVASCULAR NECROSIS

### Recent Advances



### QUESTIONS FROM STUDENTS IN AURANGABAD! AGRA!

1. Sir can you tell the latest criteria for axial spondyloarthritis

**Ans.** ASAS criteria for classification of axial spondyloarthritis (Back pain  $\geq 3$  months, age  $< 45$  years) Sacroilitis on Imaging +  $\geq 1$  spondyloarthropathy (spA) feature or HLA B27 plus  $\geq 2$  SPA features  
SPA features: Inflammatory back pain

- Arthritis
- Enthesitis
- Anterior uveitis
- Dactylitis
- Psoriasis
- Crohns disease or Ulcerative colitis
- Good response to NSAIDS
- Family history of SPA
- HLA B27
- Elevated CRP

2. Sir in a patient with below knee amputation developed a painful neuroma. Management is AIPG 2012

- |                             |                         |
|-----------------------------|-------------------------|
| A. Interferential treatment | B. Stump banding        |
| C. Infrared treatment       | D. Ultrasound treatment |

**Ans.** is 'D' Ultrasound treatment

Ultrasound treatment is good to control pain from amputation neuromas but if the question mentions TENS (Transcutaneous Electrical Nerve Stimulation) than it would be a better answer because it can inhibit pain gate pathway.

3. Sir which of the following is not a yellow flag sign:

(AIPG 2012)

- |                                              |                             |
|----------------------------------------------|-----------------------------|
| A. Radicular impingement with neural deficit | B. Social withdrawal        |
| C. Immobilization for 4 weeks                | D. Fear avoidance behaviour |

**Ans.** is 'A' Radicular impingement with neural deficit is a red flag sign not a yellow flag sign

Few students say that this also had a choice of steroids intake for 2 weeks in that case also answer is a same as prolonged steroid intake is a red flag sign not short duration course.

"Red Flag" and "Yellow Flag" signs

| Red Flag (Requires Further workup)                                                                                                                                                                                                                                                                                                                                                                          | Yellow Flag                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Red flags are possible indicators of serious spinal pathology:<br>Thoracic pain<br>Radicular impingement<br>Fever and unexplained weight loss<br>Bladder or bowel dysfunction<br>History of carcinoma<br>Ill health or presence of other medical illness<br>Progressive neurological deficit<br>Disturbed gait, saddle anaesthesia<br>Age of onset $< 20$ years or $> 55$ years<br>Prolonged steroid intake | Yellow flags are psychosocial factors shown to be indicative of long term chronicity and disability:<br>A negative attitude that back pain is harmful or potentially severely disabling<br>Fear avoidance behaviour and reduced activity levels<br>An expectation that passive, rather than active, treatment will be beneficial<br>A tendency to depression, low morale, and social withdrawal<br>Social or financial problems |

4. Sir a patient develops decreased abduction and elbow flexion.the other movements were normal. The likely diagnosis is: (AIPG 2012)

- A. Shoulder dislocation  
B. Upper trunk injury'  
C. Medial cord injury  
D. Posterior cord injury

Ans. is 'B' Upper trunk injury

Shoulder abduction and elbow flexion is supplied by C5 nerve root (ASIA scoring) hence upper trunk is affected.

5. Sir 5 year girl, Niyanta complaints of pain & swelling middle of right thigh. History of fever is present. Swelling has local temperature raised. X-ray shows: Onion peel periosteal reaction and codmans triangle and histopathology has round cells ,glycogen positive and MIC 2 positive: (AIPG 2012)

- A. Ewings sarcoma  
B. Osteosarcoma  
C. Rhabdomyosarcoma  
D. Neuroblastoma

Ans. is 'A' Ewings sarcoma

1ST decade of life,diaphyseal lesion with presentation similar to infection points towards ewings also ewings is a round cell tumor ,cells are glycogen positive and MIC 2 positive.

6. Sir Tip of little finger receives its sensations from: (AIPG 2012)

- A. C<sub>5</sub>  
B. C<sub>6</sub>  
C. C<sub>7</sub>  
D. C<sub>8</sub>

Ans. is 'A' C<sub>8</sub>

Thumb and index finger is supplied by C<sub>6</sub>

Middle finger is supplied by C<sub>7</sub>

And ring and little finger by C<sub>8</sub>

7. Main supply of the femoral head is??

- A. Medial circumflex femoral  
B. Lateral circumflex artery  
C. Profunda femoris artery  
D. External iliac artery

Ans. Blood supply to femoral head

Profunda femoris a branch of femoral artery gives Medial circumflex femoral artery that gives the lateral epiphyseal group which is the predominant artery supplying femoral head and neck. These are related to posterior aspect.

### Common mistakes in few books

|                                                    | Incorrect Information                                       | Correct                                                        |
|----------------------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------|
| • Investigation for stress fracture                | CT Scan                                                     | MRI                                                            |
| • Earliest change of OM on X-ray                   | Periosteal Reaction                                         | Loss of soft tissue plane                                      |
| • Earliest change of T.B. spine on x-ray           | Reduced Disc space                                          | Loss of curvature of spine                                     |
| • Nerve involved in Supracondylar fracture humerus | Median, Radial Nerve                                        | Anterior Intervenous nerve > Median >Radial>Ulnar nerve        |
| • CTEV Cast                                        | Below knee                                                  | Above knee                                                     |
| • Hangman's fracture                               | Pedicle/ Lamina of C2                                       | Pars inter-articularis of C <sub>2</sub>                       |
| • Most common bone to fracture at Birth            | Humerus                                                     | Clavicle                                                       |
| • Rolando fracture                                 | Extra-articular fracture base of 1 <sup>st</sup> metacarpal | Intra-articular fracture of base of 1 <sup>st</sup> metacarpal |
| • Lisfranc's dislocation                           | Inter-tarsal injury                                         | Tarso-metatarsal injury                                        |
| • Fracture Healing last 2 Stages                   | Remodelling-Modelling                                       | Consolidation → Remodelling                                    |
| • GCT                                              | 1/3 malignant                                               | About 5% malignant                                             |
| • Pulsatile bone tumor                             | GCT                                                         | Osteosarcoma > GCT                                             |
| • Tumor with Hyperglycemia                         | Multiple Myeloma                                            | Chondrosarcoma > Multiple Myeloma                              |





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